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Cover Photo: Flinders Adelaide Container Terminal. Photo courtesy of Flinders Adelaide Container Terminal.

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Foreword

Waterline is published by the Bureau of Infrastructure, Transport and Regional Economics (BITRE) and provides information on container movements on both the wharfside and the landside of five Australian major port terminals: Brisbane, Sydney, Melbourne, Adelaide and Fremantle. This Waterline issue covers port terminal activity up to the December quarter 2015.

Waterline reports on trends in container handling productivity on the waterfront in Australia as well as the cost of importing and exporting containers. It covers loading and unloading of container ships and the landside transport of containers to and from container terminals. This Waterline provides the latest data available on stevedoring productivity and landside performance.

This issue of Waterline was prepared in the Infrastructure Data Analytics Section by Anthony Carlson and Thomas Rutherford, with contributions from Adam Malarz. For further information on this report please phone Thomas Rutherford on (02) 6274 6818, Anthony Carlson on (02) 6274 6857 or email maritime_stats@infrastructure.gov.au.

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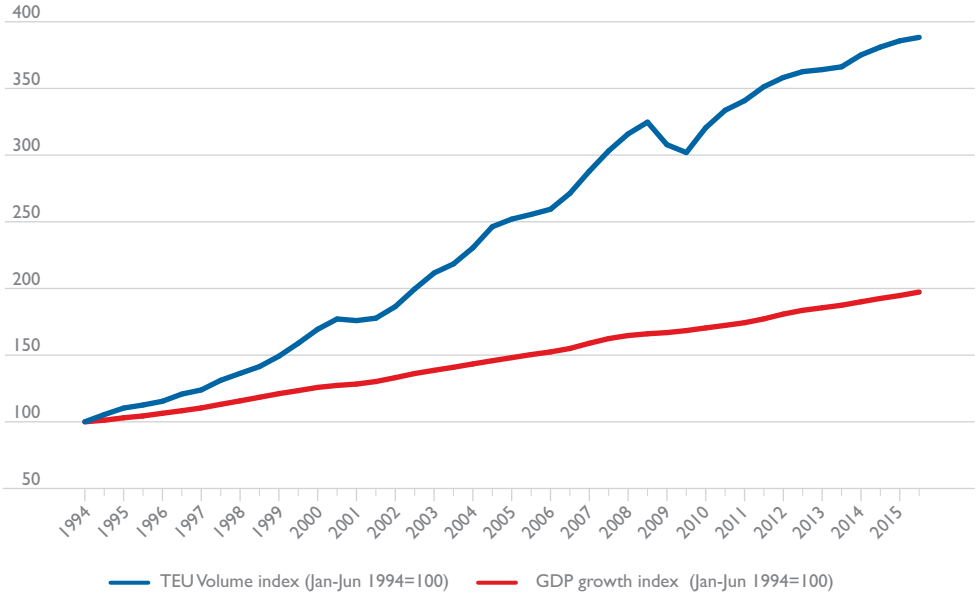
November 2016

At a glance

Throughput

- During the period July–December 2015 the *number of unitised cellular container ships (UCCs) handled by stevedores* increased by 2.6 per cent in the five ports, as compared with July–December 2014. The largest increases occurred at Adelaide and Melbourne (17.6 and 3.6 per cent respectively) and there was a decline of 1.2 per cent at Sydney.
- The total *number of twenty foot equivalent units (TEUs) handled by stevedores* increased by 1.5 per cent during the period July–December 2015, as compared with the same period in 2014. The largest increases occurred at Adelaide (6.3 per cent) and Melbourne (2.5 per cent). At Fremantle there was a decline of 5.1 per cent in TEUs handled.
- Growth in annual TEU throughput at Australia's container ports has declined to 1.9 per cent, while non-farm GDP growth was slightly higher at 2.5 per cent over the year to July–December 2015. Figure A.1 illustrates historical growth in these series. Over the period from 1994 to 2015, GDP increased by more than 90 per cent while container throughput grew by more than 280 per cent.
- The *share of TEUs handled by trucks operating under the vehicle booking or truck appointment systems* (VBS and TAS respectively) in the five ports declined from 68.3 per cent in July–December 2014 to 61.2 per cent in the same period in 2015. At Brisbane, the share of VBS/TAS truck-handled TEUs declined from 72.4 to 60.5 per cent between July–December 2014 and the same period in 2015. Similarly, at Melbourne, the share of VBS/TAS truck-handled TEUs declined from 78.9 to 68.0 per cent and at Fremantle from 63.9 to 56.5 per cent.
- *Rail's share of TEUs handled* at the five major container ports between July–December 2014 and the same period in 2015 declined from 9.8 to 9.0 per cent with the largest fall from 11.8 to 8.7 per cent in Melbourne.
- Figure A.2 illustrates the proportions of TEUs handled by VBS/TAS trucks, by rail, and the balance, for each port and the five ports total. The balance of TEUs handled outside of the VBS/TAS and rail systems relates to the movement of empty export containers via bulk runs, as well as the degree to which stevedores facilitate the ad hoc or opportunistic pickup and delivery of containers outside of pre-booked slots.
- The *balance of TEUs handled* outside the VBS/TAS and rail systems increased in the five ports from 26.8 per cent in July–December 2014 to 33.6 per cent in the same period of 2015. The largest increases in this indicator occurred at Brisbane (from 23.2 to 35.9 per cent) and Melbourne (from 21.1 to 32.0 per cent).

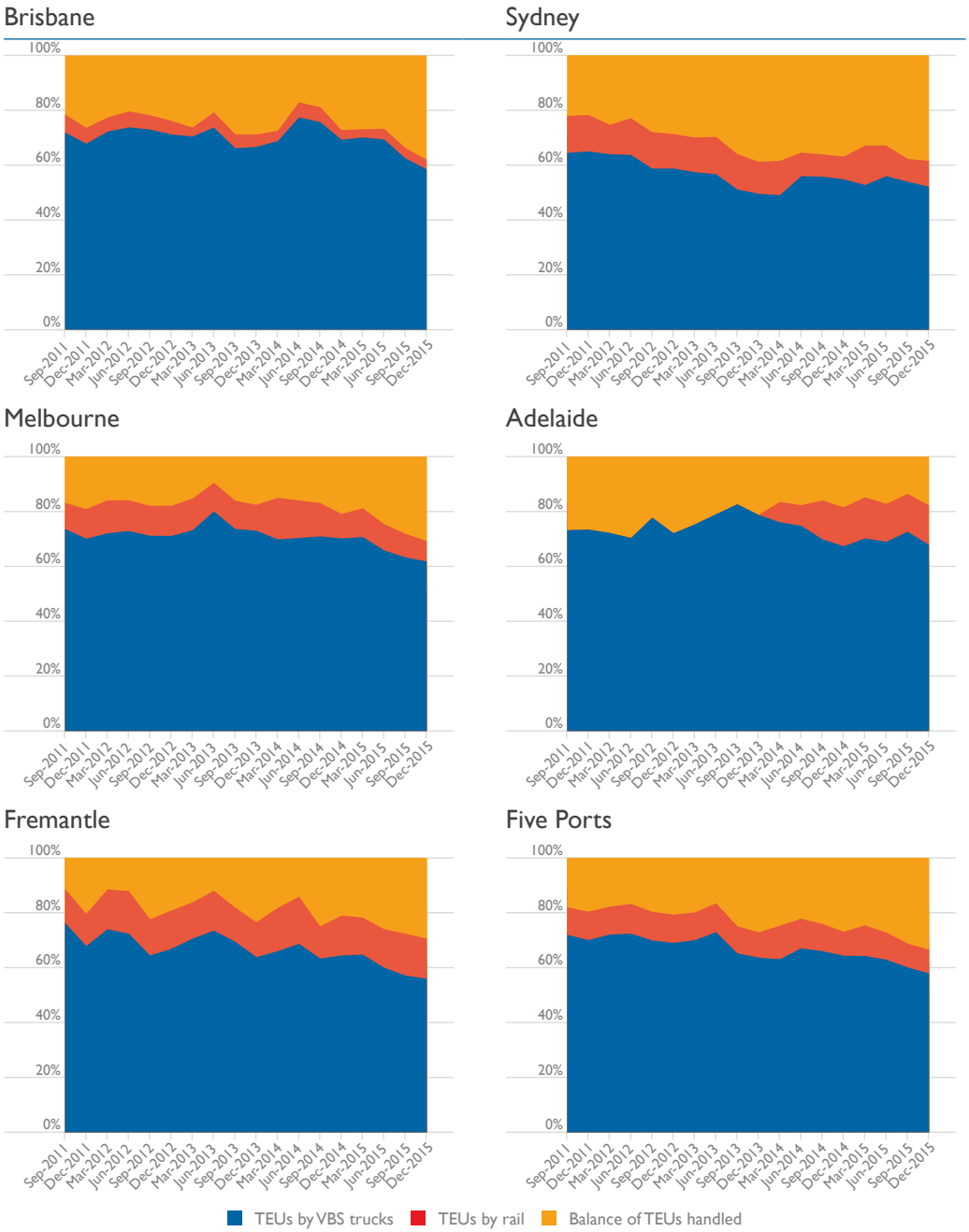
Figure A.1 Growth in container traffic compared to GDP growth (1994 = 100)



Sources: BITRE estimates (2016), ABS (2016).

Two new cranes work a vessel at Flinders Adelaide Container Terminal. Photo courtesy of Flinders Adelaide Container Terminal

Figure A.2 Proportion of containers handled by VBS/TAS trucks, rail and other



Note: Balance of TEUs handled relates to the movement of empty export containers via bulk runs (as required by the stevedores when completing loading of a vessel). The balance also reflects the degree to which stevedores facilitate the ad hoc or opportunistic pickup and delivery of containers outside pre-booked slots. The balance is computed against the total containers handled wharfside; landside-only operations are additional to the totals.

Sources: BITRE estimates (2016).

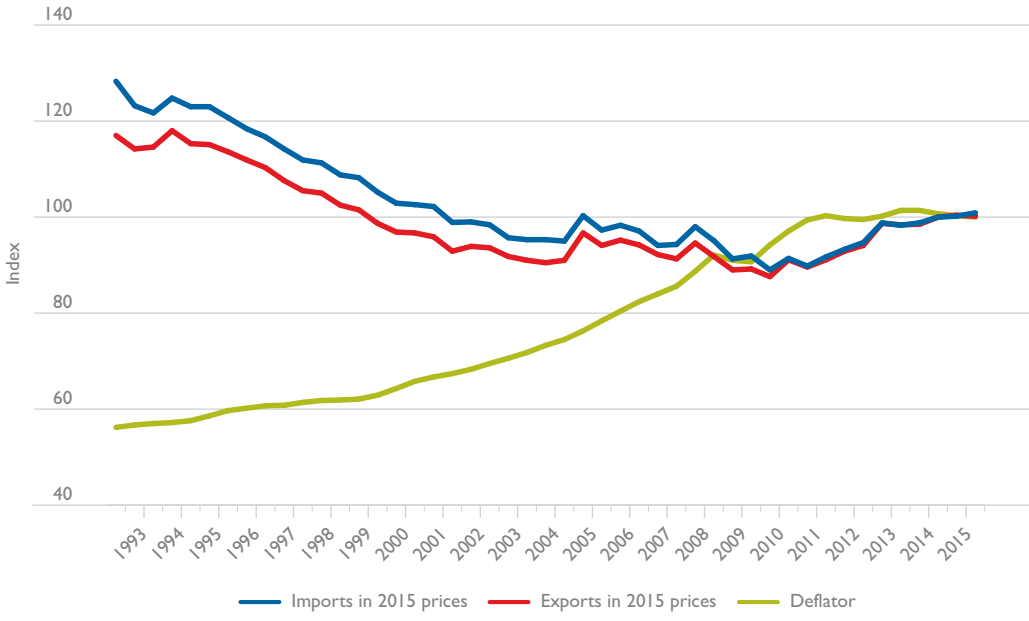
Productivity

- Compared to July–December 2014, the *median ship turnaround time* in July–December 2015 was steady at Sydney and Melbourne but improved at Brisbane (5.5 per cent decline), Adelaide (9.5 per cent decline) and Fremantle (11.3 per cent decline).
- Between July and December 2015:
  - *Average lifts per ship-hour at berth* increased by 5.9 per cent, from 39.0 to 41.3 in July–December 2015 compared to the same period in 2014.
  - *Average lifts per stevedore-hour* improved by 4.7 per cent from 42.3 to 44.3 in July–December 2015 compared to the same period in 2014.
- The *number of ships waiting for more than two hours* to enter container terminals declined from 168 to 155 but *average waiting time* increased by 5.4 per cent across the five ports, decreasing only at Melbourne. The *percentage of ships waiting at anchorage for more than 2 hours* declined in July–December 2015 compared to the same period in 2014, from 8.4 per cent to 7.7 per cent.
- Wharfside productivity improved at Adelaide in July–December 2015, with (TEUs per hour) *crane rate*, *elapsed labour rate* and *ship rate* improving by 15.9 per cent, 4.0 per cent and 2.2 per cent respectively, compared to the same period in 2014. The crane rate at Sydney declined by 7.7 per cent (TEUs per hour) for the same period, but elapsed labour rate and ship rate improved by 6.5 per cent and 1.9 per cent respectively.
- The average *elapsed labour rate* (TEUs per hour) improved by 3.8 per cent across the five ports in the period July–December 2015 (compared to the same period in 2014). During July–December 2015, crane rate declined by 3.5 per cent but ship rate increased by 1.8 per cent.
- Average *truck* and *container turnaround times* improved by 3.1 per cent and 4.5 per cent respectively in the period July–December 2015 compared to the same period in 2014. Sydney experienced a marked improvement, with truck and container turnaround times declining by 18.0 per cent and 21.5 per cent respectively.
- The *per cent of trucks backloaded* (Indicator 2.10, introduced in Waterline 57) shows the number of backloaded operations as a percentage of total VBS trucks in all five ports. During the period July–December 2015, the largest percentage of backloaded operations was in Adelaide (25.7 per cent). The share of backloaded operations declined slightly in Sydney (from 10.1 to 8.6 percent) and Melbourne (from 16.3 to 15.9 per cent) as compared with the period July–December 2014.
- The total *number of truck timeslots used* in the five ports declined by 4.2 per cent in July–December 2015 compared to the same period in 2014. In the same period, the *number of truck slots available* declined by 1.2 per cent. Usage of weekday evening truck timeslots declined by 5.4 per cent across the five ports but usage of weekday night slots increased by 6.2 per cent in July–December 2015 compared to the same period in 2014.

Port-interface cost

- The port interface cost index for exports decreased for all ship categories in the period July–December 2015:
  - For small ships (5 000 to 20 000 GT) port interface costs decreased by $4/TEU for exports;
  - For medium size ships (35 000 to 40 000 GT) port interface costs decreased by $2/TEU for exports; and
  - For large size ships (50 000 to 55 000 GT) port interface costs decreased by $3/TEU for exports.
- The port interface cost index for imports increased for all ship categories in the period July–December 2015:
  - For small ships (5 000 to 20 000 GT) port interface costs increased by $4/TEU for imports;
  - For medium size ships (35 000 to 40 000 GT) port interface costs increased by $7/TEU for imports; and
  - For large size ships (50 000 to 55 000 GT) port interface costs increased by $6/TEU for imports.
- Figure A.3 provides a long-term comparison between port interface costs for medium-sized ships (35 000–40 000 GT) and the general price level across the economy (as measured by the GDP deflator).

Figure A.3 Port interface cost indices for medium sized vessels compared to the GDP deflator



Note: Medium sized vessels range in size between 35 000 and 40 000 GT. July-December 2015 is the base period for both the GDP deflator and PICI.

Sources: BITRE estimates (2016).

Abbreviations and terms

ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
BITRE	Bureau of Infrastructure, Transport and Regional Economics
DP World	Dubai Ports World
FACT	Flinders Adelaide Container Terminal
Five ports	Refers to the aggregation of the following major container terminals at the five mainland capital city ports: • Fisherman Islands (Brisbane), • Brotherson Dock, at Port Botany (Sydney), • Swanson Dock (Melbourne), • Flinders Adelaide Container Terminal at Outer Harbor / Pelican Point (Adelaide) • North Quay in the "Inner Harbour" on the Swan River (Fremantle)
GT	Gross tonnage
Infrastructure	Department of Infrastructure and Regional Development
n.a.	Not applicable
Mins	Minutes
Pbm	Per berth metre
PICI	Port Interface Cost Index
Qtr	Quarter
TAS	Truck Appointment System (used by Hutchison Ports Australia to schedule trucks at a container terminal). See also VBS
TEU	Twenty-foot equivalent unit
TTT	Truck turnaround time
UCC	Cellular Container ship; a type of specialised container ship
VBS	Vehicle Booking System, used to schedule trucks at a container terminal. DP World and Patrick use a shared system developed by 1-Stop Connections Pty Ltd; FACT operates a similar system.

Acknowledgements

BITRE is particularly grateful for the assistance of the following organisations in the provision of data used to prepare Waterline:

- stevedoring companies: DP World, Flinders Adelaide Container Terminal, Hutchison Ports Australia, and Patrick
- individual port authorities and corporations: Port of Brisbane Pty Ltd, Port Authority of New South Wales, NSW Ports, Port of Melbourne Corporation, Flinders Ports, and Fremantle Ports
- Ports Australia
- shipping lines
- customs brokers
- road transport operators
- pilot, tug and mooring operators.

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CHAPTER 1
Measures of container terminal throughput

Overview

Chapter 1 of Waterline presents all container port throughput indicators in a consolidated format. The indicators are in four groups—wharfside, landside, whole-of-container-terminal and whole-of-port.

There are four wharfside quarterly throughput indicators:

1.1 UCC ships handled, as reported by stevedores

1.2 Total containers handled by stevedores

1.3 Total TEUs handled by stevedores

1.4 40-foot containers as per cent of all containers handled

There are nine landside quarterly throughput indicators:

1.5 Number of trucks used in VBS/TAS operations

1.6 Total number of containers transported by trucks and rail

1.7 Total number of containers transported by trucks

1.8 Number of containers by rail

1.9 Balance of containers handled landside

1.10 Total number of TEUs transported by trucks and rail

1.11 Total number of TEUs transported by trucks

1.12 Number of TEUs by rail

1.13 Balance of TEUs handled landside

Using data from port authorities, there are two quarterly whole-of-terminal throughput indicators:

1.14 Total number of container ship visits

1.15 Total number of containers (lifts) exchanged

Using data from port authorities, there are seven six-monthly whole-of-port throughput indicators:

1.16 Total cargo throughput

1.17 Non-containerised general cargo throughput

1.18 Total number of TEUs exchanged

1.19 Number of TEUs: Full import

1.20 Number of TEUs: Empty import

1.21 Number of TEUs: Full export

1.22 Number of TEUs: Empty export

Indicators are presented separately for Brisbane, Sydney, Melbourne, Adelaide and Fremantle, as well as for the five ports as a whole, where applicable.

Container terminal

The movement of containers from/to the container ship takes place on a wharf or pier known as a container terminal. Unlike a traditional wharf, a container terminal needs a large stacking area adjoining the wharf for storing containers. While in the terminal, the containers are at the disposal of a stevedoring company.

Stevedoring

The term stevedore can refer to a company which manages the operation of loading or unloading a ship. In Australia the people who work on the waterfront are referred to as waterside workers or stevedores. A stevedoring company typically owns equipment used in the loading or discharging operation and hires labour for that purpose. A stevedoring company may also contract with a terminal owner to manage all terminal operations. In Australia, there are three major stevedoring companies which handle containers: Patrick, Dubai Ports World and Hutchison Ports Australia.

Wharfside throughput measures

Measures of throughput at the wharfside relate only to containers moved by stevedoring companies from/to UCC ships at the container terminals.

Indicator 1.1 UCC ships handled, as reported by stevedores

Only fully cellular ships, or Unitized Cellular Container (UCC) ships, are included in this indicator. Normally these purpose built container ships are equipped with 40-foot cell guides below deck as a minimum requirement.

Indicator 1.2 Total containers handled

This is the total number of containers lifted on/off UCC ships. These counts are not standardised to account for different container sizes. Thus one 20-foot container and one 40-foot container are counted as two containers.

Indicator 1.3 Total TEUs handled

This indicator is derived from the total containers handled, taking into account different sizes of containers.

TEU stands for "Twenty-foot equivalent unit", a universally-recognised measure of containers which converts containers of different sizes into standardised twenty-foot units. For example, a 20-foot container equals one TEU, and a 40-foot container equals two TEUs.

Indicator 1.4 40-foot containers as per cent of all containers handled

This is the number of 40-foot containers as a percentage of all containers handled.

Landside throughput measures

Indicator 1.5 Number of trucks used in VBS/TAS operations

This is the count of trucks processed through either the vehicle booking system (VBS) or the truck appointments system (TAS). This count excludes trucks that perform bulk runs of empty containers between the container parks and container terminals. This indicator counts trucks on a round trip. That is, a truck entering a container terminal and the same truck exiting the container terminal is counted as one truck.

Indicator 1.6 Total number of containers transported by trucks and rail

This indicator includes the total number of containers transported in all modes on the landside, either by trucks or by rail. Counts of containers in this indicator are further broken down into Indicator 1.7 (containers moved by trucks) and Indicator 1.8 (containers moved by rail).

Indicator 1.7 Total number of containers transported by trucks

This indicator includes the total number of containers transported by VBS/TAS trucks. This indicator is computed using data provided by stevedores. In previous editions of Waterline, this indicator included the trucks undertaking bulk runs; this has been discontinued due to inconsistent data.

Indicator 1.8 Number of containers by rail

This indicator counts the total number of containers carried by rail in or out of a container terminal, and is based on data provided by each container port authority. This indicator includes containers processed "on dock" and those handled through "near dock" rail sidings. "On dock" refers to situations where the rail siding is on dock in a container terminal. In contrast, "near dock" rail sidings are in the neighbourhood of the container terminal but not on the dock. Only "on dock" rail data is reported for Sydney as port precinct rail data is not available.

Indicator 1.9 Balance of containers handled landside

This indicator shows the difference between the throughput of containers on the wharfside (Indicator 1.2) and the total containers transported by VBS/TAS trucks and rail (Indicator 1.6). It illustrates the scale and variability of the container handling task outside of VBS/TAS and railway operations. This indicator includes containers handled by consignees' own transport, but excludes landside-only operations.

To avoid double counting of containers, this indicator is calculated differently in Melbourne and Adelaide, where it is the difference between throughput of containers on the wharfside (Indicator 1.2) and the number of containers transported by VBS/TAS trucks (Indicator 1.5).

Due to the mix of operations at Brisbane, both the standard and alternate calculations may double-count some containers. The standard calculation is used.

Indicator 1.10 Total number of TEUs transported by trucks and rail

This indicator includes the total number of TEUs transported by VBS/TAS trucks, bulk run trucks, and by rail. Counts of TEUs in this indicator are further broken down into Indicator 1.11 (TEUs moved by trucks) and Indicator 1.12 (TEUs moved by rail).

Indicator 1.11 Total number of TEUs transported by trucks

This indicator includes the total number of TEUs transported by VBS/TAS trucks. In previous editions of Waterline, this indicator included the number of TEUs transported by trucks undertaking bulk runs; this has been discontinued due to inconsistent data.

Indicator 1.12 Number of TEUs by rail

This is a count of the total number of TEUs carried by rail in or out of a container terminal based on data provided by each container port authority. This indicator includes TEUs processed "on dock" and those handled through "near dock" rail sidings. "On dock" refers to situations where the rail siding is on dock in a container terminal. In contrast, "near dock" rail sidings are in the neighbourhood of the container terminal but not on the dock. Only "on dock" rail data is reported for Sydney as port precinct rail data is not available.

Indicator 1.13 Balance of TEUs handled landside

This indicator is similar to Indicator 1.9, but calculated in TEUs. It shows the difference between the throughput of TEUs on the wharfside (Indicator 1.3) and the total TEUs transported by VBS/TAS trucks and rail (Indicator 1.10).

To avoid double counting of TEUs, this indicator is calculated differently in Melbourne and Adelaide, where it is the difference between throughput of TEUs on the wharfside (Indicator 1.3) and the number of TEUs transported by VBS/TAS trucks (Indicator 1.11).

Due to the mix of operations at Brisbane, both the standard and alternate calculations may double-count some TEUs. The standard calculation is used.

Whole-of-container-terminal throughput

Indicator 1.14 Total number of container ship visits

This is a count of all port calls by UCC ships where the vessel visited and exchanged containers at the container terminal. Table 1.7 summarises ship visits by size of ship and by container port.

Indicator 1.15 Total number of containers (lifts) exchanged

This indicator is estimated using Indicator 1.4 (percentage of 40-foot containers) and the total number of TEUs exchanged with container vessels, as reported by ports.

Whole-of-port throughput

Indicator 1.16 Total cargo throughput

This is the weight, measured in tonnes, of all container and non-container general cargoes that passed through the port.

Indicator 1.17 Non-containerised general cargo throughput

This is the weight of non-container general cargoes processed through a port. Non-container general cargo refers to break bulk commodities including machinery, iron and steel products, timber, paper and timber products and other general cargoes. It does not include bulk cargoes.

Indicator 1.18 Total number of TEUs exchanged

This is a count of TEUs, exchanged through the port. This count is further broken down into Indicators 1.19 to 1.22.

Indicator 1.19 Full import TEUs

This is a count of full containers in TEUs imported (unloaded) at the port.

Indicator 1.20 Empty import TEUs

This is a count of empty containers in TEUs imported (unloaded) at the port.

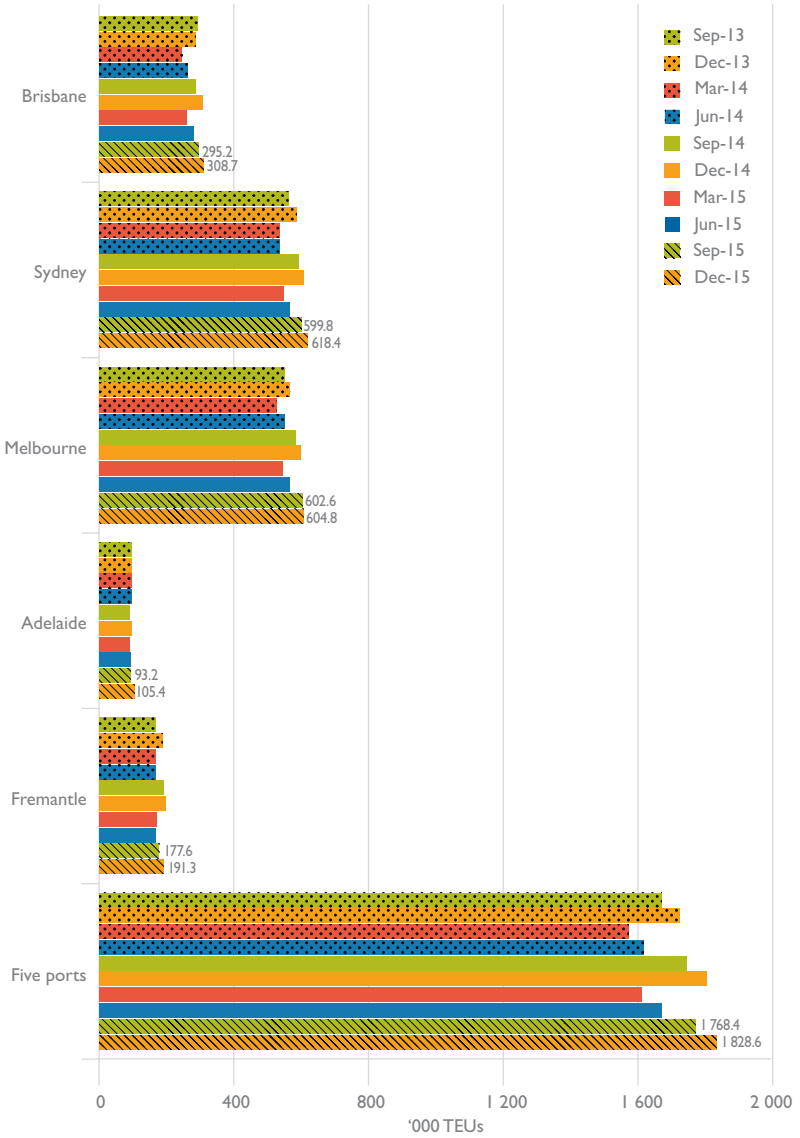
Indicator 1.21 Full export TEUs

This is a count of full containers in TEUs exported (loaded) at the port.

Indicator 1.22 Empty export TEUs

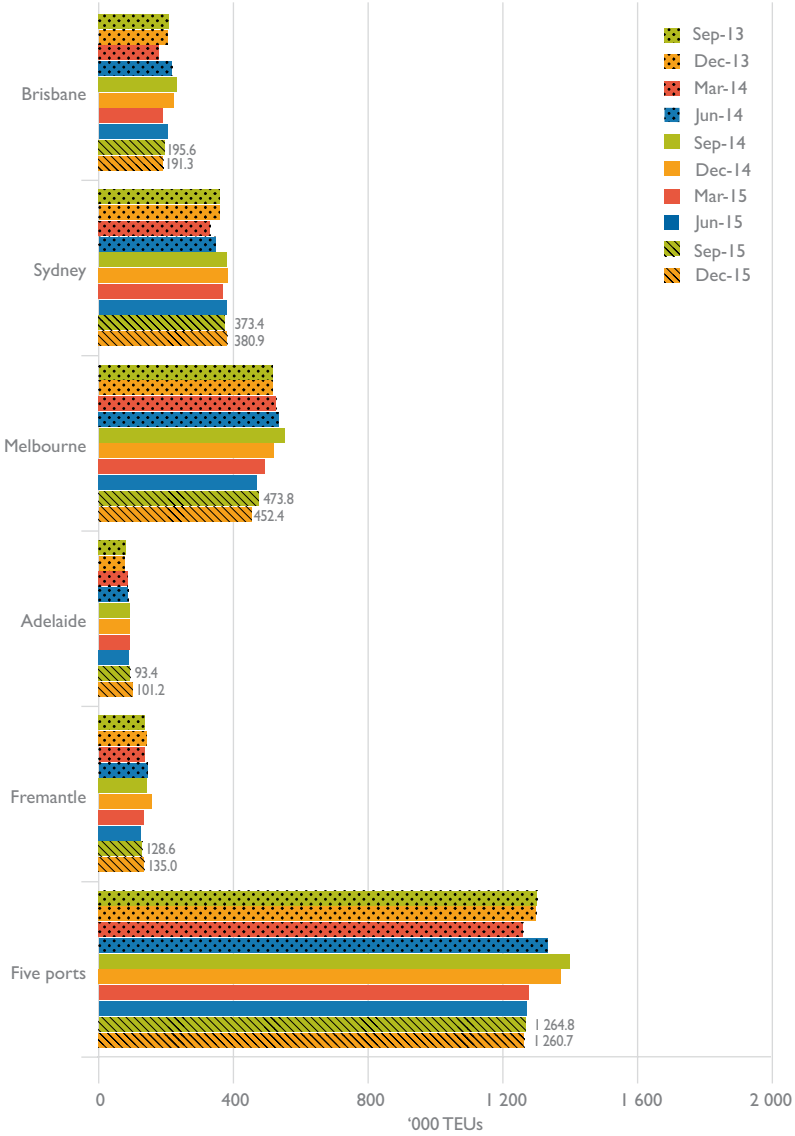
This is a count of empty containers in TEUs exported (loaded) at the port.

Figure 1.1 TEU throughput by container port: Wharf-side of port



Sources: DP World (2016), Flinders Adelaide Container Terminal (2016), Hutchison Ports Australia (2016) and Patrick (2016).

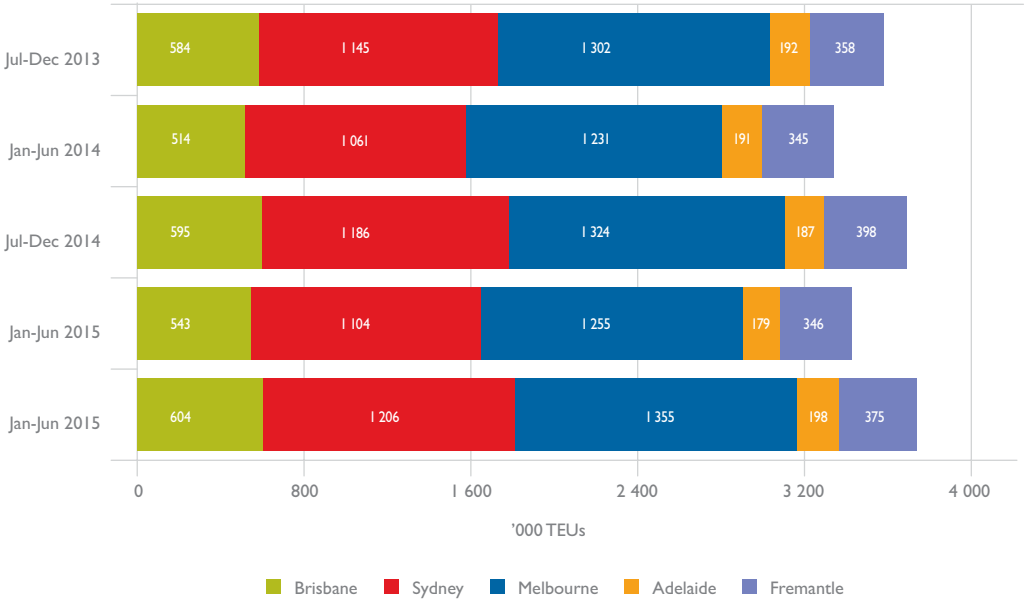
Figure 1.2 TEU throughput by container port: Landside of port



Notes: The data in this figure shows the total TEUs moved on the landside by rail and by VBS/TAS trucks where data are available.

Sources: DP World (2016), Flinders Adelaide Container Terminal (2016), Hutchison Ports Australia (2016), Patrick (2016), Flinders Ports (2016), Port of Brisbane Pty Ltd (2016), Port of Melbourne Corporation (2016) and Fremantle Ports (2016).

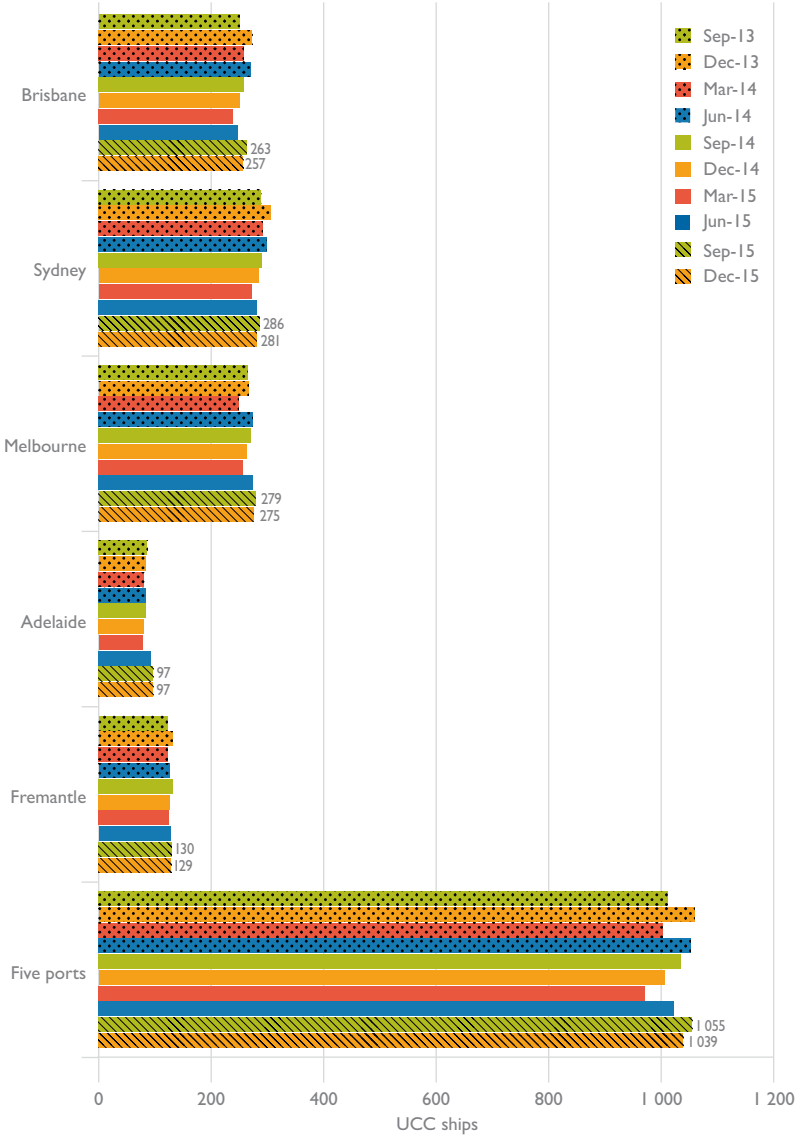
Figure 1.3 TEU throughput by container port: Whole of port



Notes: The data relate to terminals at Fisherman Islands (Brisbane), Brotherson Dock at Port Botany (Sydney), Swanson Dock (Melbourne), Flinders Adelaide Terminal at Outer Harbor/Pelican Point (Adelaide), and North Quay in the Inner Harbour (Fremantle).

Sources: Port of Brisbane Pty Ltd (2016), Port Authority of New South Wales (2016), Port of Melbourne Corporation (2016), Flinders Ports (2016) and Fremantle Ports (2016).

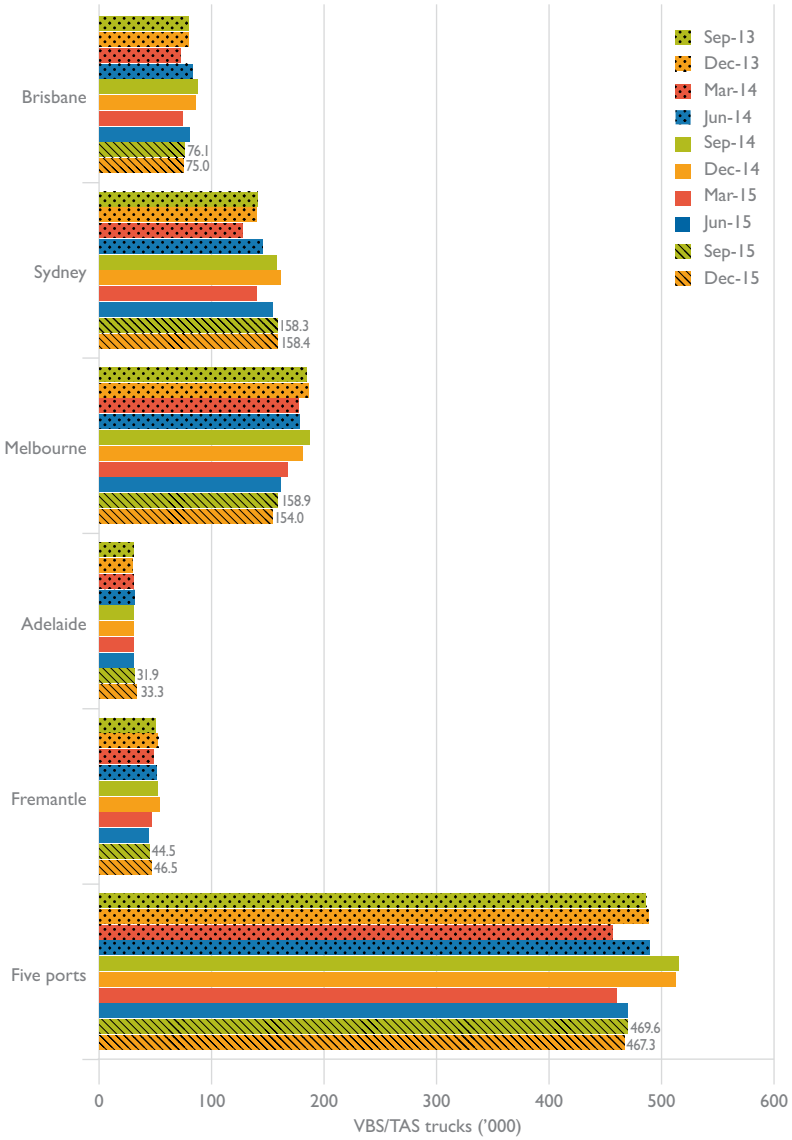
Figure 1.4 Container terminal traffic: Number of UCC ships handled



Notes: The data contained in this figure relates to Indicator 1.1 as defined in the explanatory notes and Table 1.1 to 1.6.

Sources: DP World (2016), Flinders Adelaide Container Terminal (2016), Hutchison Ports Australia (2016) and Patrick (2016).

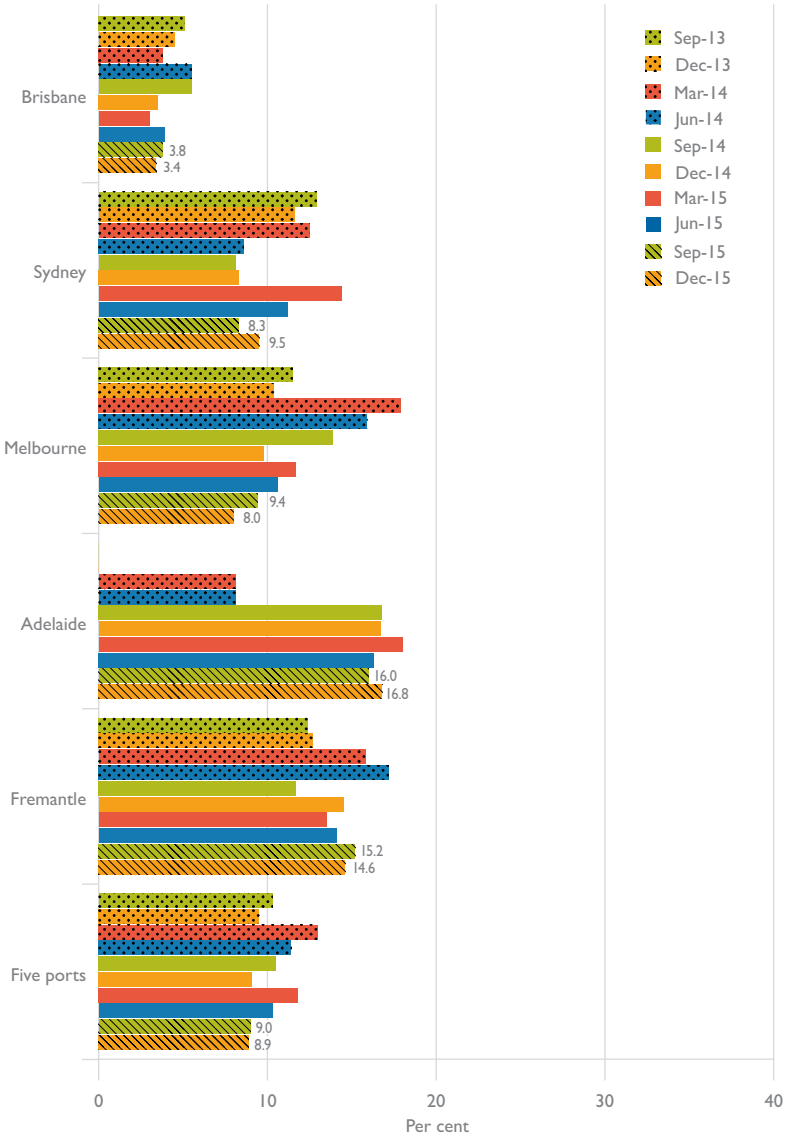
Figure 1.5 Container terminal traffic: Number of trucks used in VBS/TAS operations



Notes: Data on number of trucks used in bulk runs are not available.

Sources: DP World (2016), Flinders Adelaide Container Terminal (2016), Hutchison Ports Australia (2016) and Patrick (2016).

Figure 1.6 Rail share of TEUs handled



Sources: DP World (2016), Flinders Adelaide Container Terminal (2016), Hutchison Ports Australia (2016), Patrick (2016), Flinders Ports (2016), Port of Brisbane Pty Ltd (2016), Port of Melbourne Corporation (2016) and Fremantle Ports (2016).

Table 1.1 Container terminal throughput: Brisbane

	2013			2014						2015					
	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec
Wharfside															
UCC ships handled, as reported by stevedores	250	273	**523**	258	270	**528**	258	250	**508**	239	247	**486**	263	257	**520**
Total containers handled *('000)*	197.2	190.7	**387.9**	167.3	179.5	**346.8**	191.0	203.3	**394.2**	172.9	191.0	**363.9**	197.7	208.1	**405.8**
Total TEUs handled *('000)*	292.3	286.2	**578.5**	245.9	262.6	**508.6**	285.3	305.2	**590.5**	258.4	279.0	**537.4**	295.2	308.7	**603.9**
40-foot containers as per cent of all containers handled *(%)*	48.2	50.1	**49.2**	47.0	46.3	**46.6**	49.4	50.1	**49.8**	49.4	46.1	**47.7**	49.3	48.4	**48.8**
Landside															
Number of trucks used in VBS/TAS operations *('000)*	79.9	79.7	**159.6**	72.1	83.2	**155.3**	87.7	85.7	**173.4**	74.4	80.6	**155.0**	76.1	75.0	**151.2**
Total containers transported by VBS/TAS trucks and rail *('000)*	144.8	142.3	**287.1**	125.1	149.3	**274.4**	157.8	153.2	**311.1**	128.7	142.4	**271.2**	136.1	133.8	**269.9**
Containers by VBS/TAS trucks *('000)*	133.4	131.9	**265.3**	117.2	137.9	**255.1**	145.5	143.7	**289.3**	121.6	132.4	**254.0**	125.9	124.2	**250.1**
Containers by rail *('000)*	11.3	10.5	**21.8**	7.9	11.4	**19.3**	12.3	9.5	**21.8**	7.2	10.0	**17.2**	10.2	9.6	**19.8**
Balance of containers handled landside *('000)*	52.4	48.4	**100.8**	42.2	30.2	**72.4**	33.2	50.0	**83.2**	44.2	48.6	**92.7**	61.6	74.3	**135.9**
Total TEUs transported by VBS/TAS trucks and rail *('000)*	208.3	203.7	**412.0**	178.3	217.7	**396.0**	231.5	222.1	**453.5**	188.9	204.4	**393.3**	195.6	191.3	**386.9**
TEUs by VBS/TAS trucks *('000)*	193.4	190.7	**384.1**	169.1	203.3	**372.4**	215.9	211.4	**427.3**	181.1	193.5	**374.6**	184.4	180.7	**365.0**
TEUs by rail *('000)*	14.9	13.0	**27.8**	9.2	14.4	**23.6**	15.6	10.7	**26.2**	7.8	10.9	**18.7**	11.2	10.6	**21.9**
Balance of TEUs handled landside *('000)*	84.0	82.5	**166.5**	67.6	45.0	**112.5**	53.8	83.1	**136.9**	69.5	74.6	**144.1**	99.6	117.4	**217.0**
Whole of container terminal															
Total number of container ship visits	253	266	**519**	248	263	**511**	252	234	**486**	236	236	**472**	244	241	**485**
Total containers (lifts) exchanged *('000)*	196.8	186.5	**383.3**	167.5	174.2	**341.7**	190.6	196.8	**387.3**	170.7	186.0	**356.7**	189.3	201.6	**390.9**
Whole of port															
Total cargo throughput *(million tonnes)*			**18.8**			**19.9**			**33.6**	8.8	7.9	**16.7**	7.5	7.7	**15.2**
Non-containerised general cargo throughput *(million tonnes)*			**0.5**			**0.5**			**0.4**	0.2	0.2	**0.4**	0.2	0.2	**0.4**
Total TEUs exchanged *('000)*			**583.7**			**513.6**			**595.2**	262.9	280.6	**543.5**	294.7	309.2	**603.9**
Full import *('000)*			**259.5**			**228.0**			**264.9**	118.3	118.9	**237.2**	131.7	135.5	**267.1**
Empty import *('000)*			**36.4**			**31.0**			**35.0**	13.2	23.5	**36.8**	20.1	19.7	**39.8**
Full export *('000)*			**178.0**			**145.4**			**167.3**	64.7	87.4	**152.0**	81.5	87.6	**169.1**
Empty export *('000)*			**109.8**			**109.2**			**128.1**	66.7	50.8	**117.5**	61.4	66.4	**127.8**

Note: Blank cells mean no data was reported in that period. Prior to March 2015, whole-of-port statistics were reported at six-monthly intervals only.

Balance of TEUs handled may include some or all of: empty container operations, bulk runs and containers handled at the port by importers/exporters. The balance is computed against the total containers handled wharfside; landside-only operations are additional to the totals.

Sources: DP World (2016), Hutchison Ports Australia (2016), Patrick (2016) and Port of Brisbane Pty Ltd (2016).

Table 1.2 Container terminal throughput: Sydney

	2013			2014					2015					
	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec
Wharfside															
UCC ships handled, as reported by stevedores	289	306	**595**	292	299	**591**	290	284	**574**	272	281	**553**	286	281	**567**
Total containers handled *('000)*	366.7	387.0	**753.7**	352.6	355.2	**707.9**	387.6	393.5	**781.2**	354.9	367.0	**721.8**	389.4	399.3	**788.7**
Total TEUs handled *('000)*	561.0	584.5	**1 145.5**	535.9	536.2	**1 072.1**	592.4	606.8	**1 199.2**	547.7	563.5	**1 111.3**	599.8	618.4	**1 218.3**
40-foot containers as per cent of all containers handled *(%)*	53.0	51.1	**52.0**	52.0	50.9	**51.5**	52.8	54.2	**53.5**	54.4	53.6	**54.0**	54.0	54.9	**54.5**
Landside															
Number of trucks used in VBS/TAS operations *('000)*	141.1	140.3	**281.4**	127.8	145.3	**273.1**	157.9	161.0	**318.9**	139.9	153.8	**293.7**	158.3	158.4	**316.7**
Total containers transported by VBS/TAS trucks and rail *('000)*	243.4	241.6	**485.0**	223.0	229.7	**452.7**	249.3	252.4	**501.7**	243.6	257.7	**501.2**	257.7	264.9	**522.6**
Containers by VBS/TAS trucks *('000)*	191.4	192.6	**383.9**	174.1	197.8	**371.9**	217.0	218.2	**435.2**	189.0	214.7	**403.7**	225.0	225.7	**450.7**
Containers by rail *('000)*	52.0	49.1	**101.1**	48.8	31.9	**80.8**	32.3	34.2	**66.5**	54.5	43.0	**97.5**	32.7	39.2	**71.9**
Balance of containers handled landside *('000)*	123.3	145.3	**268.7**	129.7	125.5	**255.2**	138.3	141.1	**279.4**	111.3	109.3	**220.6**	131.7	134.4	**266.1**
Total TEUs transported by VBS/TAS trucks and rail *('000)*	359.1	357.7	**716.8**	329.9	346.3	**676.2**	378.7	382.9	**761.6**	367.6	378.4	**745.9**	373.4	380.9	**754.2**
TEUs by VBS/TAS trucks *('000)*	286.8	289.8	**576.6**	262.9	300.1	**563.1**	330.6	332.8	**663.4**	288.8	315.5	**604.3**	323.8	322.3	**646.1**
TEUs by rail *('000)*	72.3	68.0	**140.2**	66.9	46.2	**113.1**	48.1	50.1	**98.2**	78.7	62.9	**141.6**	49.6	58.5	**108.2**
Balance of TEUs handled landside *('000)*	201.9	226.8	**428.7**	206.0	189.9	**395.9**	213.7	223.9	**437.6**	180.2	185.2	**365.3**	226.4	237.6	**464.0**
Whole of container terminal															
Total number of container ship visits	286	298	**584**	285	293	**578**	288	275	**563**	260	267	**527**	277	271	**548**
Total containers (lifts) exchanged *('000)*	337.0	359.2	**696.2**	320.6	322.1	**642.7**	361.5	362.9	**724.4**	350.1	362.7	**712.7**	385.3	392.3	**777.6**
Whole of port															
Total cargo throughput *(million tonnes)*			**9.8**			**9.3**			**10.3**	4.4	5.8	**10.3**	5.7	6.4	**12.1**
Non-containerised general cargo throughput *(million tonnes)*			**0.0**			**0.0**			**0.0**	0.0	0.0	**0.0**	0.0	0.0	**0.0**
Total TEUs exchanged *('000)*			**1 145.3**			**1 061.1**			**1 185.9**	542.4	561.3	**1 103.7**	592.1	614.2	**1 206.3**
Full import *('000)*			**576.6**			**524.6**			**597.8**	265.3	282.0	**547.4**	299.2	307.5	**606.7**
Empty import *('000)*			**3.4**			**5.5**			**6.3**	3.1	2.3	**5.5**	2.1	3.9	**6.0**
Full export *('000)*			**227.5**			**208.5**			**233.8**	112.1	122.8	**234.9**	112.3	121.2	**233.6**
Empty export *('000)*			**337.8**			**322.6**			**348.0**	161.8	154.2	**316.0**	178.4	181.5	**359.9**

Note: Blank cells mean no data was reported in that period. Prior to March 2015, whole-of-port statistics were reported at six-monthly intervals only.

Cells with an entry of "0.0" mean that data were reported but rounded to zero.

Balance of TEUs handled may include some or all of: empty container operations, bulk runs and containers handled at the port by importers/exporters. The balance is computed against the total containers handled wharfside; landside-only operations are additional to the totals.

Sources: DP World (2016), Patrick (2016) and NSW Ports (2016).

Table 1.3 Container terminal throughput: Melbourne

	2013			2014						2015					
	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec
Wharfside															
UCC ships handled, as reported by stevedores	265	266	**531**	249	274	**523**	271	264	**535**	257	274	**531**	279	275	**554**
Total containers handled *('000)*	364.6	377.4	**742.1**	355.3	370.8	**726.2**	388.6	395.5	**784.2**	363.6	376.8	**740.4**	399.1	400.9	**800.0**
Total TEUs handled *('000)*	550.1	565.9	**1 116.0**	525.2	548.4	**1 073.6**	581.9	595.7	**1 177.7**	543.1	563.1	**1 106.2**	602.6	604.8	**1 207.4**
40-foot containers as per cent of all containers handled *(%)*	50.9	49.9	**50.4**	47.8	47.9	**47.9**	49.7	50.6	**50.2**	49.4	49.4	**49.4**	51.0	50.9	**50.9**
Landside															
Number of trucks used in VBS/TAS operations *('000)*	184.2	185.8	**370.0**	177.3	178.4	**355.7**	186.9	180.6	**367.6**	167.6	161.3	**328.9**	158.9	154.0	**312.9**
Total containers transported by VBS/TAS trucks and rail *('000)*	344.3	348.7	**693.0**	362.1	362.2	**724.4**	371.3	349.8	**721.0**	332.1	319.1	**651.1**	319.5	302.7	**622.2**
Containers by VBS/TAS trucks *('000)*	302.4	309.3	**611.7**	298.7	303.4	**602.1**	317.3	311.0	**628.3**	289.5	279.2	**568.7**	282.0	270.5	**552.5**
Containers by rail *('000)*	41.9	39.4	**81.2**	63.5	58.8	**122.2**	54.0	38.8	**92.8**	42.5	39.9	**82.4**	37.5	32.2	**69.7**
Balance of containers handled landside *('000)*	62.2	68.1	**130.3**	56.6	67.4	**124.1**	71.4	84.5	**155.9**	74.0	97.7	**171.7**	117.1	130.4	**247.5**
Total TEUs transported by VBS/TAS trucks and rail *('000)*	514.7	515.2	**1 029.9**	526.1	533.8	**1 059.9**	550.9	517.5	**1 068.4**	492.4	469.6	**962.0**	473.8	452.4	**926.2**
TEUs by VBS/TAS trucks *('000)*	451.6	456.2	**907.7**	432.3	446.9	**879.2**	470.1	459.2	**929.2**	428.8	410.0	**838.8**	417.2	403.8	**821.0**
TEUs by rail *('000)*	63.2	59.0	**122.2**	93.8	86.9	**180.7**	80.9	58.4	**139.2**	63.5	59.7	**123.2**	56.6	48.6	**105.2**
Balance of TEUs handled landside *('000)*	98.5	109.7	**208.3**	92.9	101.5	**194.5**	111.9	136.6	**248.4**	114.3	153.1	**267.4**	185.4	201.1	**386.4**
Whole of container terminal															
Total number of container ship visits	281	284	**565**	261	266	**527**	266	259	**525**	249	267	**516**	271	265	**536**
Total containers (lifts) exchanged *('000)*	368.9	380.0	**748.9**	359.2	361.6	**720.9**	384.4	389.2	**773.6**	359.0	373.3	**732.3**	393.8	392.1	**785.9**
Whole of port															
Total cargo throughput *(million tonnes)*			**17.6**			**17.4**			**17.2**	8.4	9.0	**17.5**	8.7	8.8	**17.5**
Non-containerised general cargo throughput *(million tonnes)*			**1.1**			**1.0**			**1.1**	0.5	0.6	**1.1**	0.6	0.6	**1.1**
Total TEUs exchanged *('000)*			**1 302.2**			**1 230.5**			**1 323.8**	616.6	638.5	**1 255.1**	673.9	681.1	**1 355.0**
Full import *('000)*			**593.6**			**538.7**			**608.8**	278.9	284.0	**562.9**	315.2	313.3	**628.5**
Empty import *('000)*			**59.4**			**75.6**			**57.6**	29.5	36.1	**65.7**	25.2	28.9	**54.1**
Full export *('000)*			**438.3**			**441.0**			**429.3**	204.8	218.1	**422.8**	206.4	213.8	**420.1**
Empty export *('000)*			**210.9**			**175.2**			**228.0**	103.4	100.3	**203.7**	127.1	125.1	**252.2**

Note: Blank cells mean no data was reported in that period. Prior to March 2015, whole-of-port statistics were reported at six-monthly intervals only.

Balance of TEUs handled may include some or all of: empty container operations, bulk runs and containers handled at the port by importers/exporters. The balance is computed against the total containers handled wharfside; landside-only operations are additional to the totals.

The counts of containers by rail include those handled by Qube Logistics.

Sources: DP World (2016), Patrick (2016) and Port of Melbourne Corporation (2016).

Table 1.4 Container terminal throughput: Adelaide

	2013			2014						2015					
	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec
Wharfside															
UCC ships handled, as reported by stevedores	86	83	**169**	81	84	**165**	84	81	**165**	78	93	**171**	97	97	**194**
Total containers handled *('000)*	68.1	69.4	**137.5**	69.6	70.8	**140.4**	65.1	67.7	**132.9**	63.0	64.3	**127.4**	65.0	74.7	**139.7**
Total TEUs handled *('000)*	96.5	96.2	**192.7**	95.3	97.3	**192.6**	91.5	95.3	**186.8**	89.1	92.1	**181.3**	93.2	105.4	**198.6**
40-foot containers as per cent of all containers handled *(%)*	41.7	38.6	**40.2**	37.0	37.5	**37.2**	40.5	40.7	**40.6**	41.4	43.2	**42.3**	43.4	41.0	**42.1**
Landside															
Number of trucks used in VBS/TAS operations *('000)*	30.7	29.8	**60.5**	31.0	31.9	**62.9**	30.4	31.0	**61.5**	31.0	30.3	**61.3**	31.9	33.3	**65.2**
Total containers transported by VBS/TAS trucks and rail *('000)*	55.2	53.6	**108.8**	62.3	62.2	**124.5**	64.5	64.4	**128.8**	64.6	62.6	**127.2**	64.7	71.3	**135.9**
Containers by VBS/TAS trucks *('000)*	55.2	53.6	**108.8**	56.7	56.4	**113.1**	53.3	52.9	**106.3**	53.2	51.9	**105.0**	54.5	58.8	**113.3**
Containers by rail *('000)*	0.0	0.0	**0.0**	5.6	5.8	**11.4**	11.1	11.4	**22.6**	11.4	10.7	**22.1**	10.2	12.5	**22.7**
Balance of containers handled landside *('000)*	12.9	15.8	**28.7**	12.9	14.4	**27.3**	11.8	14.8	**26.6**	9.9	12.5	**22.3**	10.5	15.9	**26.4**
Total TEUs transported by VBS/TAS trucks and rail *('000)*	80.3	76.3	**156.6**	86.7	87.0	**173.7**	91.0	91.5	**182.5**	91.0	89.9	**180.9**	93.4	101.2	**194.6**
TEUs by VBS/TAS trucks *('000)*	80.3	76.3	**156.6**	79.0	79.1	**158.1**	75.7	75.5	**151.2**	75.0	74.9	**149.9**	78.5	83.5	**162.0**
TEUs by rail *('000)*	0.0	0.0	**0.0**	7.7	7.9	**15.6**	15.3	15.9	**31.3**	16.0	15.0	**31.0**	14.9	17.7	**32.6**
Balance of TEUs handled landside *('000)*	16.3	19.8	**36.1**	16.3	18.2	**34.5**	15.8	19.7	**35.6**	14.1	17.2	**31.3**	14.7	21.8	**36.5**
Whole of container terminal															
Total number of container ship visits	86	86	**172**	81	82	**163**	85	81	**166**	77	92	**169**	98	97	**195**
Total containers (lifts) exchanged *('000)*	67.1	69.7	**136.7**	69.2	69.7	**139.0**	65.5	67.5	**133.0**	61.8	63.9	**125.6**	65.2	74.4	**139.6**
Whole of port															
Total cargo throughput *(million tonnes)*			**8.0**			**8.1**			**7.0**	3.9	3.7	**7.6**	3.5	3.6	**7.1**
Non-containerised general cargo throughput *(million tonnes)*			**0.2**			**0.2**			**0.1**	0.1	0.1	**0.2**	0.1	0.1	**0.2**
Total TEUs exchanged *('000)*			**191.9**			**190.8**			**187.0**	87.3	91.6	**178.9**	93.4	104.9	**198.4**
Full import *('000)*			**72.9**			**67.0**			**70.6**	33.6	33.1	**66.7**	35.4	39.2	**74.6**
Empty import *('000)*			**24.3**			**27.4**			**22.6**	10.8	13.4	**24.2**	10.4	14.0	**24.4**
Full export *('000)*			**76.9**			**81.1**			**77.6**	36.9	39.0	**75.9**	38.0	41.2	**79.1**
Empty export *('000)*			**17.8**			**15.3**			**16.2**	6.0	6.1	**12.1**	9.7	10.6	**20.2**

Note: Blank cells mean no data was reported in that period. Prior to March 2015, whole-of-port statistics were reported at six-monthly intervals only.

Cells with an entry of "0.0" mean that data were reported but rounded to zero.

Balance of TEUs handled may include some or all of: empty container operations, bulk runs and containers handled at the port by importers/exporters. The balance is computed against the total containers handled wharfside; landside-only operations are additional to the totals.

Sources: Flinders Adelaide Container Terminal (2016) and Flinders Ports (2016).

Table 1.5 Container terminal throughput: Fremantle

	2013			2014						2015					
	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec
Wharfside															
UCC ships handled, as reported by stevedores	122	131	**253**	123	126	**249**	132	127	**259**	125	128	**253**	130	129	**259**
Total containers handled *('000)*	112.2	125.2	**237.4**	114.1	117.5	**231.6**	129.8	132.8	**262.7**	115.3	112.8	**228.1**	118.2	127.1	**245.3**
Total TEUs handled *('000)*	167.0	186.8	**353.8**	166.6	168.3	**334.8**	190.4	198.2	**388.7**	170.6	168.6	**339.2**	177.6	191.3	**368.9**
40-foot containers as per cent of all containers handled *(%)*	48.8	49.2	**49.0**	46.0	43.2	**44.6**	46.7	49.2	**48.0**	48.0	49.5	**48.7**	50.2	50.5	**50.4**
Landside															
Number of trucks used in VBS/TAS operations *('000)*	50.3	52.4	**102.7**	48.4	50.8	**99.2**	52.1	53.9	**106.0**	46.6	44.1	**90.8**	44.5	46.5	**90.9**
Total containers transported by VBS/TAS trucks and rail *('000)*	97.2	101.7	**198.9**	99.9	107.0	**206.8**	103.5	111.2	**214.7**	93.0	86.5	**179.4**	89.8	93.6	**183.4**
Containers by VBS/TAS trucks *('000)*	81.1	83.5	**164.6**	78.7	83.5	**162.2**	85.6	88.9	**174.6**	75.8	69.6	**145.4**	70.2	73.4	**143.7**
Containers by rail *('000)*	16.1	18.2	**34.3**	21.2	23.5	**44.6**	17.9	22.3	**40.2**	17.2	16.8	**34.0**	19.6	20.2	**39.8**
Balance of containers handled landside *('000)*	15.0	23.5	**38.5**	14.2	10.6	**24.8**	26.3	21.6	**47.9**	22.3	26.4	**48.6**	28.4	33.5	**61.9**
Total TEUs transported by VBS/TAS trucks and rail *('000)*	136.8	143.0	**279.7**	136.3	144.4	**280.7**	142.9	156.6	**299.4**	133.4	124.8	**258.3**	128.6	135.0	**263.6**
TEUs by VBS/TAS trucks *('000)*	116.0	119.2	**235.2**	110.0	115.5	**225.5**	120.5	127.7	**248.3**	110.4	101.1	**211.5**	101.5	107.0	**208.5**
TEUs by rail *('000)*	20.8	23.8	**44.5**	26.3	28.9	**55.2**	22.3	28.8	**51.2**	23.0	23.7	**46.7**	27.0	28.0	**55.0**
Balance of TEUs handled landside *('000)*	30.2	43.8	**74.1**	30.3	23.8	**54.1**	47.6	41.7	**89.2**	37.1	43.8	**80.9**	49.1	56.3	**105.3**
Whole of container terminal															
Total number of container ship visits	123	129	**252**	129	125	**254**	132	126	**258**	126	128	**254**	132	130	**262**
Total containers (lifts) exchanged *('000)*	112.6	121.8	**234.4**	115.8	116.2	**232.0**	129.1	131.0	**260.1**	114.6	112.0	**226.6**	119.8	124.7	**244.5**
Whole of port															
Total cargo throughput *(million tonnes)*			**15.6**			**17.8**			**17.4**	9.2	9.3	**18.5**	8.2	8.6	**16.8**
Non-containerised general cargo throughput *(million tonnes)*			**0.5**			**0.5**			**0.5**	0.2	0.2	**0.4**	0.2	0.2	**0.5**
Total TEUs exchanged *('000)*			**357.7**			**345.4**			**398.1**	174.1	171.4	**345.5**	182.6	192.2	**374.9**
Full import *('000)*			**176.5**			**164.1**			**189.8**	83.1	82.9	**166.1**	90.0	93.7	**183.7**
Empty import *('000)*			**9.0**			**14.0**			**17.1**	4.6	5.4	**10.0**	5.1	5.9	**11.0**
Full export *('000)*			**96.6**			**109.4**			**118.2**	52.4	51.9	**104.2**	49.0	52.9	**101.9**
Empty export *('000)*			**75.6**			**57.9**			**72.9**	34.0	31.2	**65.2**	38.7	39.6	**78.3**

Note: Blank cells mean no data was reported in that period. Prior to March 2015, whole-of-port statistics were reported at six-monthly intervals only.

Balance of TEUs handled may include some or all of: empty container operations, bulk runs and containers handled at the port by importers/exporters. The balance is computed against the total containers handled wharfside; landside-only operations are additional to the totals.

Sources: DP World (2016), Patrick (2016) and Fremantle Ports (2016).

Table 1.6 Container terminal throughput: Five ports

	2013			2014					2015					
	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec
Wharfside															
UCC ships handled, as reported by stevedores	1 012	1 059	**2 071**	1 003	1 053	**2 056**	1 035	1 006	**2 041**	971	1 023	**1 994**	1 055	1 039	**2 094**
Total containers handled *('000)*	1 108.9	1 149.6	**2 258.5**	1 059.0	1 093.9	**2 152.9**	1 162.2	1 192.9	**2 355.1**	1 069.6	1 112.0	**2 181.6**	1 169.5	1 210.0	**2 379.5**
Total TEUs handled *('000)*	1 666.9	1 719.6	**3 386.5**	1 568.9	1 612.8	**3 181.7**	1 741.6	1 801.2	**3 542.8**	1 608.9	1 666.4	**3 275.3**	1 768.4	1 828.6	**3 597.0**
40-foot containers as per cent of all containers handled *(%)*	50.3	49.6	**49.9**	48.2	47.4	**47.8**	49.9	51.0	**50.4**	50.4	49.9	**50.1**	51.2	51.1	**51.2**
Landside															
Number of trucks used in VBS/TAS operations *('000)*	486.2	488.1	**974.3**	456.6	489.6	**946.2**	515.1	512.2	**1 027.3**	459.6	470.1	**929.7**	469.6	467.3	**936.9**
Total containers transported by VBS/TAS trucks and rail *('000)*	884.9	887.9	**1 772.8**	872.4	910.4	**1 782.8**	946.4	931.0	**1 877.4**	861.9	868.2	**1 730.2**	867.8	866.2	**1 734.1**
Containers by VBS/TAS trucks *('000)*	763.5	770.8	**1 534.3**	725.4	779.1	**1 504.4**	818.7	814.9	**1 633.6**	729.1	747.8	**1 476.9**	757.6	752.6	**1 510.2**
Containers by rail *('000)*	121.4	117.1	**238.5**	147.0	131.3	**278.4**	127.6	116.1	**243.8**	132.8	120.5	**253.3**	110.2	113.6	**223.8**
Balance of containers handled landside *('000)*	265.9	301.1	**567.0**	255.6	248.1	**503.7**	281.0	312.1	**593.0**	261.6	294.4	**556.0**	349.3	388.5	**737.8**
Total TEUs transported by VBS/TAS trucks and rail *('000)*	1 299.2	1 295.9	**2 595.1**	1 257.3	1 329.3	**2 586.6**	1 395.0	1 370.6	**2 765.5**	1 273.3	1 267.1	**2 540.4**	1 264.8	1 260.7	**2 525.5**
TEUs by VBS/TAS trucks *('000)*	1 128.1	1 132.2	**2 260.3**	1 053.3	1 144.9	**2 198.2**	1 212.8	1 206.6	**2 419.4**	1 084.2	1 095.0	**2 179.2**	1 105.4	1 097.3	**2 202.7**
TEUs by rail *('000)*	171.1	163.7	**334.8**	204.0	184.3	**388.3**	182.2	163.9	**346.1**	189.1	172.1	**361.2**	159.4	163.4	**322.9**
Balance of TEUs handled landside *('000)*	430.9	482.7	**913.6**	413.1	378.4	**791.5**	442.8	505.0	**947.8**	415.2	474.0	**889.1**	575.1	634.1	**1 209.2**
Whole of container terminal															
Total number of container ship visits	1 029	1 063	**2 092**	1 004	1 029	**2 033**	1 023	975	**1 998**	948	990	**1 938**	1 022	1 004	**2 026**
Total containers (lifts) exchanged *('000)*	1 082.4	1 117.2	**2 199.5**	1 032.4	1 043.7	**2 076.2**	1 131.0	1 147.5	**2 278.5**	1 056.1	1 097.8	**2 153.9**	1 153.3	1 185.0	**2 338.4**
Whole of port															
Total cargo throughput *(million tonnes)*			**69.8**			**72.6**			**85.5**	34.7	35.7	**70.5**	33.6	35.1	**68.7**
Non-containerised general cargo throughput *(million tonnes)*			**2.2**			**2.2**			**2.1**	1.0	1.1	**2.1**	1.1	1.1	**2.2**
Total TEUs exchanged *('000)*			**3 580.7**			**3 341.5**			**3 690.0**	1 683.3	1 743.4	**3 426.7**	1 836.8	1 901.6	**3 738.3**
Full import *('000)*			**1 679.1**			**1 522.4**			**1 731.9**	779.3	801.0	**1 580.3**	871.5	889.2	**1 760.7**
Empty import *('000)*			**132.4**			**153.5**			**138.6**	61.2	80.8	**142.0**	62.9	72.4	**135.3**
Full export *('000)*			**1 017.4**			**985.4**			**1 026.2**	470.8	519.1	**989.9**	487.2	516.7	**1 003.8**
Empty export *('000)*			**751.8**			**680.1**			**793.3**	372.0	342.5	**714.5**	415.2	423.2	**838.5**

Note: Blank cells mean no data was reported in that period. Prior to March 2015, whole-of-port statistics were reported at six-monthly intervals only.

Balance of TEUs handled may include some or all of: empty container operations, bulk runs and containers handled at the port by importers/exporters. The balance is computed against the total containers handled wharfside; landside-only operations are additional to the totals.

Sources: DP World (2016), Patrick (2016), Hutchison Ports Australia (2016), Flinders Adelaide Container Terminal (2016), Port of Brisbane Pty Ltd (2016), NSW Ports (2016), Port of Melbourne Corporation (2016), Flinders Ports (2016) and Fremantle Ports (2016).

Table 1.7 Container terminal throughput: Container Ship Visits by Port, July–December 2015

	Brisbane	Sydney	Melbourne	Adelaide	Fremantle	Total
Gross Tonnage						
5 000–20 000 GT	44	57	64	0	28	193
20 001–35 000 GT	58	92	52	34	20	256
35 001–40 000 GT	44	69	73	32	32	250
40 001–50 000 GT	170	146	160	46	49	571
50 001 and above GT	167	182	186	83	132	750
All ship sizes	484	546	535	195	261	2 021

Sources: Port of Brisbane Pty Ltd (2016), NSW Ports (2016), Port of Melbourne Corporation (2016), Flinders Ports (2016) and Fremantle Ports (2016).

Table 1.8 Container terminal throughput: Container Ship Visits by Port, January–June 2015

	Brisbane	Sydney	Melbourne	Adelaide	Fremantle	Total
Gross Tonnage						
5 000–20 000 GT	48	63	55	0	24	190
20 001–35 000 GT	57	93	55	25	16	246
35 001–40 000 GT	57	80	80	38	39	294
40 001–50 000 GT	135	112	125	36	51	459
50 001 and above GT	172	176	199	70	123	740
All ship sizes	471	524	514	169	253	1 931

Sources: Port of Brisbane Pty Ltd (2015), NSW Ports (2015), Port of Melbourne Corporation (2015), Flinders Ports (2015) and Fremantle Ports (2015).

CHAPTER 2
Measures of container terminal productivity

Overview

Chapter 2 of Waterline presents container terminal productivity measures. The indicators are in three groups—wharfside, landside and whole-of-container-terminal.

Seven quarterly wharfside productivity indicators are covered:

2.1 Crane rate – containers per hour

2.2 Elapsed labour rate – containers per hour

2.3 Ship rate – containers per hour

2.4 Crane rate – TEUs per hour

2.5 Elapsed labour rate – TEUs per hour

2.6 Ship rate – TEUs per hour

2.7 Throughput pbm (containers per berth metre).

The following five quarterly landside productivity indicators are reported for trucks involved in VBS/TAS operations. Bulk run trucks are not included in calculating these indicators:

2.8 Containers per truck

2.9 TEUs per truck

2.10 Per cent of trucks backloaded

2.11 Average truck turnaround time

2.12 Average container turnaround time.

Twelve indicators are reported for whole-of-container-terminal productivity.

2.13 Median of ship turnaround time

2.14 95th percentile of ship turnaround time

2.15 Number of ships waiting at anchorage for more than 2 hours

2.16 Per cent of ships waiting at anchorage for more than 2 hours

2.17 Average waiting time at anchorage

2.18 Median waiting time at anchorage

2.19 Total time ships spent at berth

2.20 Average TEUs per ship-hour at berth

2.21 Average lifts per ship-hour at berth

2.22 Total time ships available to stevedores

2.23 Average lifts per hour of stevedoring operation

2.24 Average lifts per berth visit.

The indicators are presented for Brisbane, Sydney, Melbourne, Adelaide, and Fremantle, as well as aggregates of the five ports, where applicable.

Wharfside productivity measures

Measures of productivity on the wharfside of a container terminal relate only to containers moved by stevedoring companies from/to UCC ships at that container terminal.

Indicator 2.1 Crane rate – containers per hour

This is computed as the total number of containers handled divided by the total elapsed crane time (see details in Box 1). This indicator is interpreted as a proxy measure for the productivity of capital at a container terminal.

Indicator 2.2 Elapsed labour rate – containers per hour

This indicator measures labour productivity at a container terminal and is computed as the number of containers handled divided by the total elapsed labour time (see details in Box 2). Sometimes this measure is reported as the "ship working rate".

Indicator 2.3 Ship rate – containers per hour

This is the average number of containers moved on or off a ship in an hour. Generally, this indicator measures the combined stevedoring productivity of capital and labour.

Indicator 2.4 Crane rate – TEUs per hour

This is similar to Indicator 2.1 after converting containers to TEUs.

Indicator 2.5 Elapsed labour rate – TEUs per hour

This is similar to Indicator 2.2 after converting containers to TEUs.

Indicator 2.6 Ship rate – TEUs per hour

This is similar to Indicator 2.3 after converting containers to TEUs.

Indicator 2.7 Throughput pbm (containers per berth metre)

This is the number of containers through a container terminal divided by the length (in metres) of berths. At a container terminal it measures the intensity of use of the terminal container handling facility. The six month figure is a weighted average of the corresponding quarterly throughput.

Box 1: Elapsed Crane Time

This is the crane time allocated by the stevedore to work on a container ship, assuming the container ship is ready for loading or unloading. It is computed as the total allocated crane hours, less operational and non-operational delays:

- No labour allocated
- Closed-port holiday
- Port-wide industrial stoppage
- Total crane time spent handling break-bulk cargo and containers that require manual intervention, e.g. use of wires, chains, non-rigid spreaders or other handling gear
- Award or enterprise agreement breaks as applicable
- Adverse weather
- Delays caused by the ship or its agent
- All breakdowns, including spreader changes
- Other equipment breakdowns which stop crane operations
- Booming up for passing ships
- Handling hatch covers
- Cage work and lashing/unlashing where crane operations are affected
- Crane long-travelling between hatches and crossing accommodation
- Labour withdrawn without operator's agreement including enterprise agreement related industrial stoppages
- Over-dimensional containers requiring additional (rigid) spreader
- Spreader changes
- Waiting for export cargo
- Defective ship's gear (e.g. jammed twist-locks, broken cell guides, ballast pumps unable to maintain list/trim).

Box 2: Elapsed Labour Time

This is the time elapsed between labour first boarding a container ship and labour last leaving the ship, less any time when the labour has not worked for whatever reasons including non-operational delays such as:

- No labour allocated to ship
- Closed-port holiday
- Industrial stoppages
- Break bulk and containers that require manual interventions, e.g. use of wires, chains, non-rigid spreaders or other handling gear.

Landside productivity measures

These indicators relate to the performance in processing containers through the formal vehicle booking systems (VBS and TAS). They do not include the performance of bulk run trucks.

Indicator 2.8 Containers per truck

Count of containers processed through the VBS/TAS systems divided by the total number of VBS/TAS trucks used.

Indicator 2.9 TEUs per truck

Count of TEUs through the VBS/TAS systems divided by the total number of VBS/TAS trucks used. In contrast to Indicator 2.8, this indicator measures the truck efficiency in a standard unit, a TEU, and thus takes into account the different sizes of containers.

Indicator 2.10 Per cent of trucks backloaded

'Backloaded operations' refers to trucks which haul containers on both the inbound and outbound legs of a single trip. Such operations make more effective use of trucks and landside infrastructure. This indicator shows the number of backloaded trucks as a percentage of the total VBS/TAS trucks in Brisbane, Sydney, Melbourne and Fremantle. It was published for the first time in Waterline 57.

Indicator 2.11 Average truck turnaround time

This indicator measures the time elapsed from when the truck enters the gate of a container terminal to the time when the truck exits the gate. This measure does not include the time the truck waits outside the gate of a container terminal. This is a measure of stevedoring efficiency and shows how fast (expressed in minutes) a stevedoring company processes a truck at a container terminal.

Indicator 2.12 Average container turnaround time

This is as the "average truck turnaround time" (Indicator 2.11) divided by "average containers per truck" (Indicator 2.8). It is a measure of the stevedoring efficiency in handling containers at a container terminal.

Container turnaround time improves (that is, it goes down) if either the truck utilisation rates improve, implying that the number of containers per truck increases, or the container terminal is faster in processing each truck.

Whole of container terminal measures

Indicator 2.13 Median of ship turnaround time

This is the median of the time (in hours) a container ship is in a port. It is the time that elapses from the time a ship enters a port to the time a ship leaves the port.

Indicator 2.14 95th percentile of ship turnaround time

The 95th percentile indicates that for 95 per cent of the ships, the turnaround time is below the value of the indicator. Conversely, for 5 per cent of the ships, the turnaround time is above the value of the indicator.

Indicator 2.15 Number of ships waiting at anchorage for more than 2 hours

This indicator provides the number of container ships, as reported by port authorities, that waited for longer than 2 hours for port entry clearance at the time of the ship's first entry. Delay before entering a port usually results from the geography-specific situation of a port and may also be caused by operational reasons, either at the terminal, the ship, or both.

Indicator 2.16 Per cent of ships waiting at anchorage for more than 2 hours

This is the number of container ships in Indicator 2.15 as a per cent of the total number of container ships that visited the container terminal in the period.

Indicator 2.17 Average waiting time at anchorage

This is the average time (hours) ships have waited at anchorage. Only ships that waited for port entry clearance for two hours or more are included in the calculation.

Indicator 2.18 Median waiting time at anchorage

This is the median time (hours) ships have waited at anchorage. Only ships that waited for port entry clearance for two hours or more are included in the calculation.

Indicator 2.19 Total time ships spent at berth

This is the total hours spent in berth by all dedicated container ships (UCC) that exchanged containers at that port. The time a ship spends at berth is the elapsed time between the time a ship arrives at berth and the time of its departure from berth. Port authorities report the berth time as a "gross value" including all times spent by a ship at berth such as time for loading/unloading containers, for maintenance and supply operations, or waiting for labour or suitable weather.

Indicator 2.20 Average TEUs per ship-hour at berth

This is the total TEUs lifted on/off dedicated container ships (UCC) divided by the total time ship spent at berth (Indicator 2.19). The indicator is strongly influenced by changes in average number of TEUs exchanged per visiting ships and by the mix of ship sizes during the period. The average number of TEUs exchanged also varies seasonally and cyclically.

Indicator 2.21 Average lifts per ship-hour at berth

This indicator is similar to Indicator 2.20 whereas the total crane lifts (containers handled) is used in calculating the indicator rather than the number of TEUs.

Indicator 2.22 Total time ships are available to stevedores

This is the total time (in hours) when ships can be loaded or unloaded.

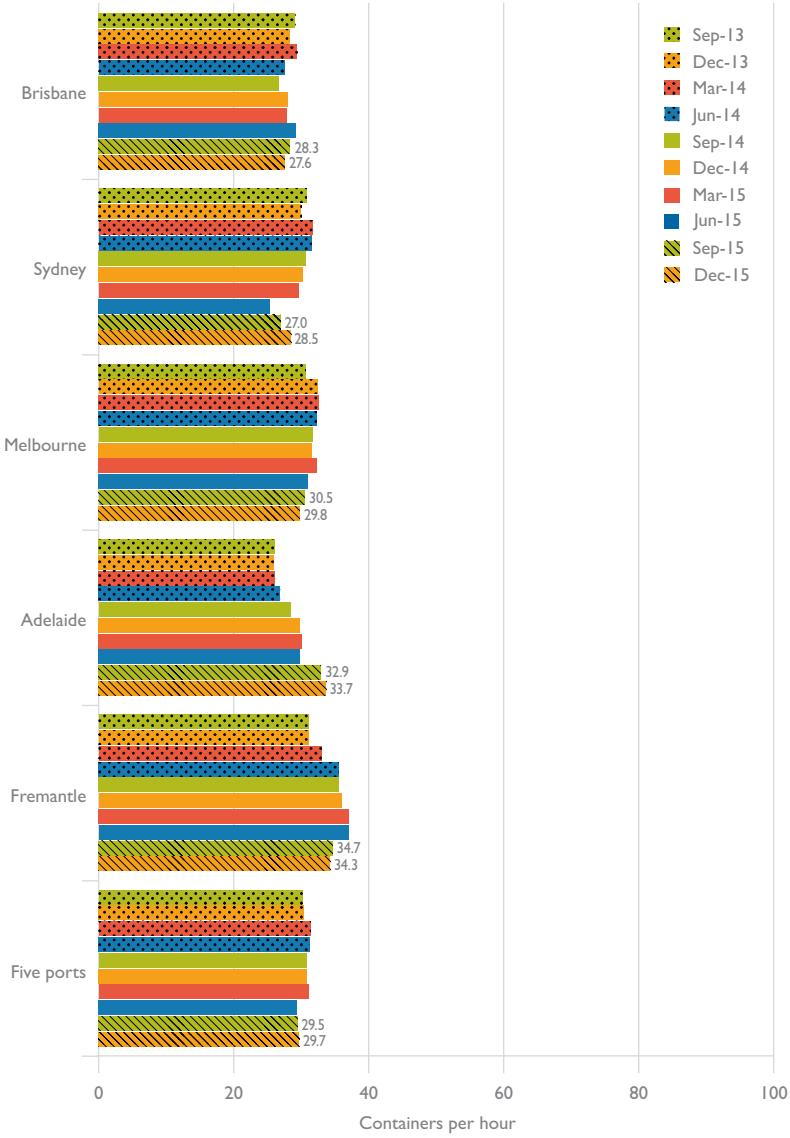
Indicator 2.23 Average lifts per hour of stevedoring operation

This is the total number of crane lifts (containers handled) divided by the total (gross) time available to stevedores for loading and unloading containers.

Indicator 2.24 Average lifts per berth visit

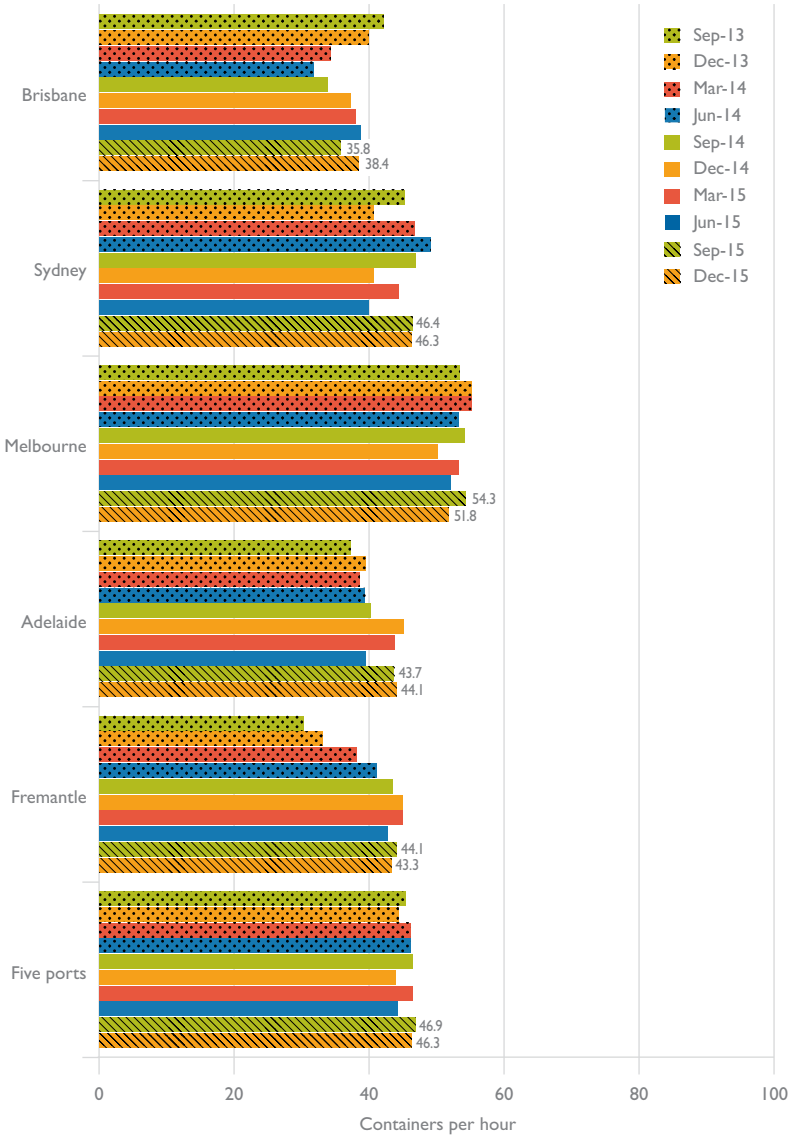
This is the number of crane lifts (containers handled) divided by the number of berth visits of dedicated container ships (UCC).

Figure 2.1 Wharf-side crane rate



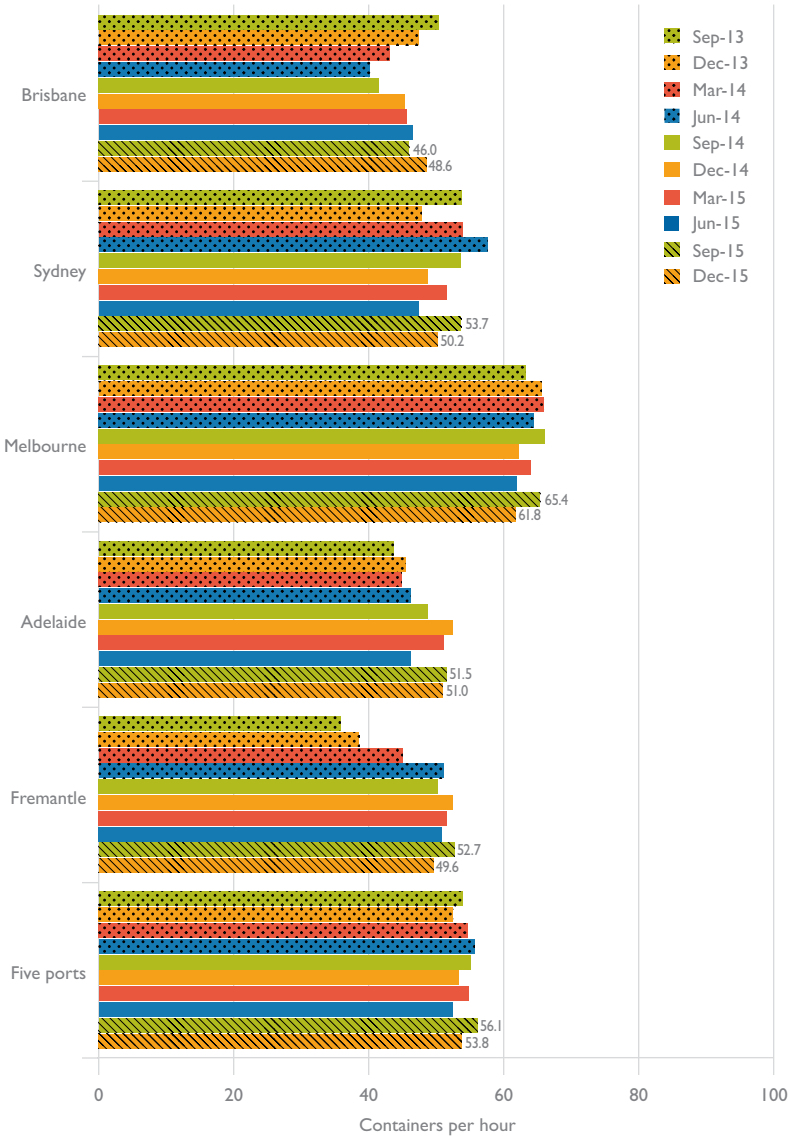
Sources: DP World (2016), Flinders Adelaide Container Terminal (2016), Hutchison Ports Australia (2016) and Patrick (2016).

Figure 2.2 Wharf-side elapsed labour rate



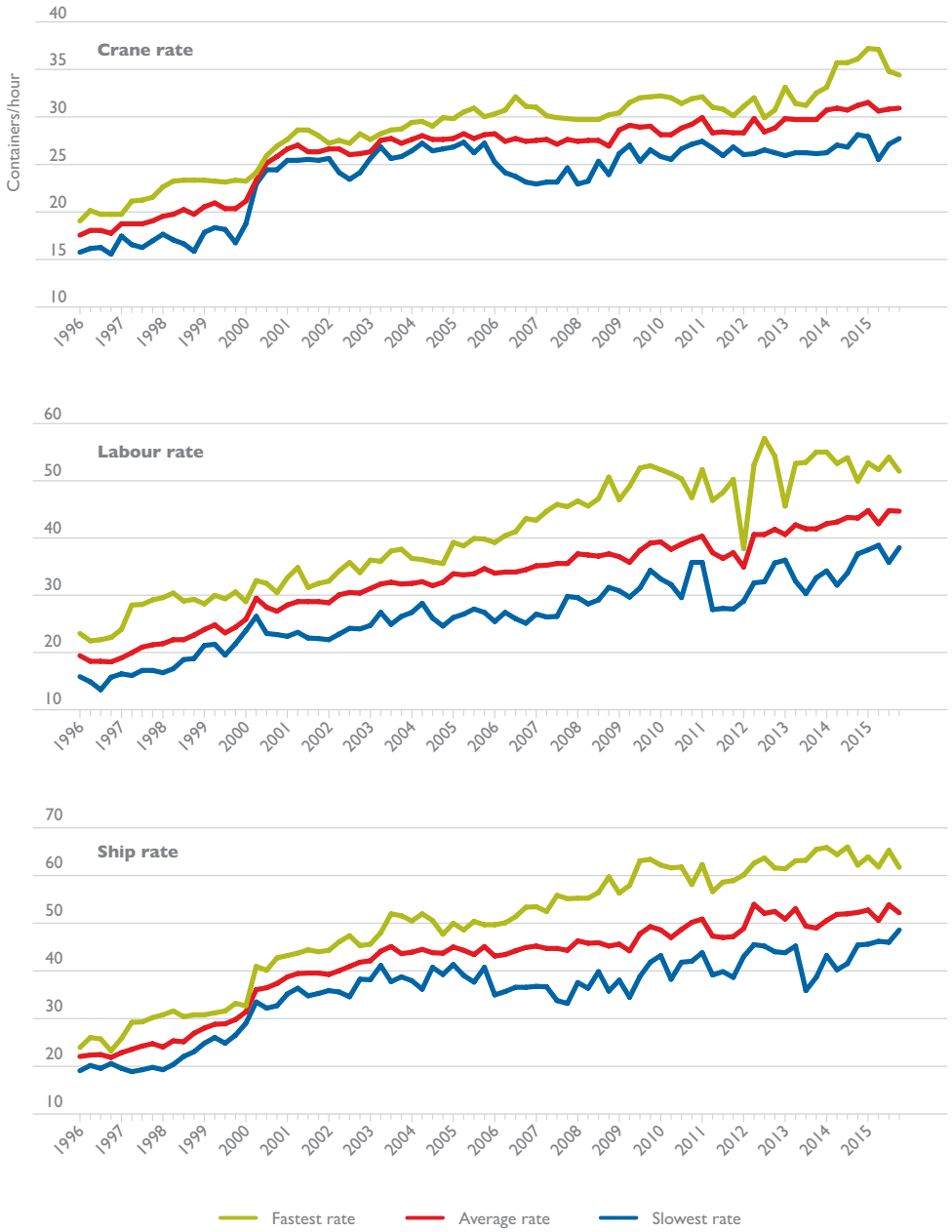
Sources: DP World (2016), Flinders Adelaide Container Terminal (2016), Hutchison Ports Australia (2016) and Patrick (2016).

Figure 2.3 Wharf-side ship rate



Sources: DP World (2016), Flinders Adelaide Container Terminal (2016), Hutchison Ports Australia (2016) and Patrick (2016).

Figure 2.4 Productivity in five ports: Comparison of wharf-side rates

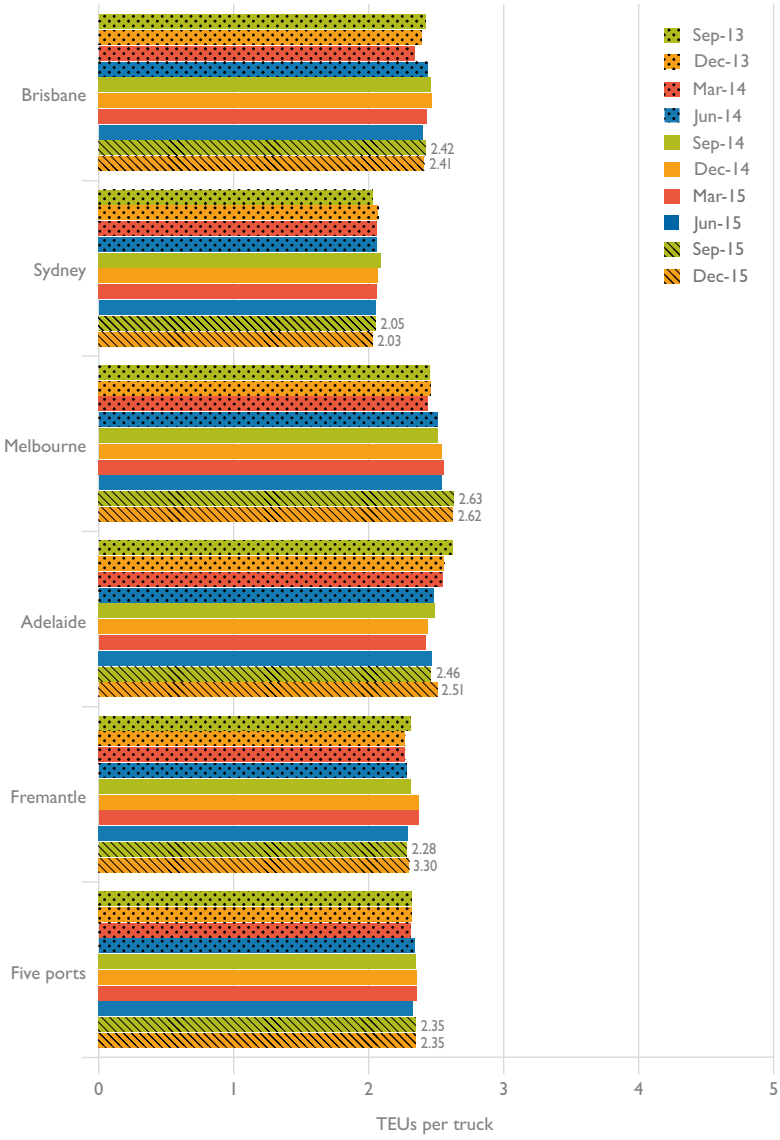


Notes: The wharfside crane rate, labour rate and ship rate are compared among all five ports and the fastest, average and slowest rates are illustrated. The fastest and slowest rate may correspond to different ports in different periods.

Crane rate, labour rate and ship rate are measured in containers per crane hour, elapsed labour hour and berth hour respectively.

Sources: DP World (2016), Flinders Adelaide Container Terminal (2016), Hutchison Ports Australia (2016) and Patrick (2016).

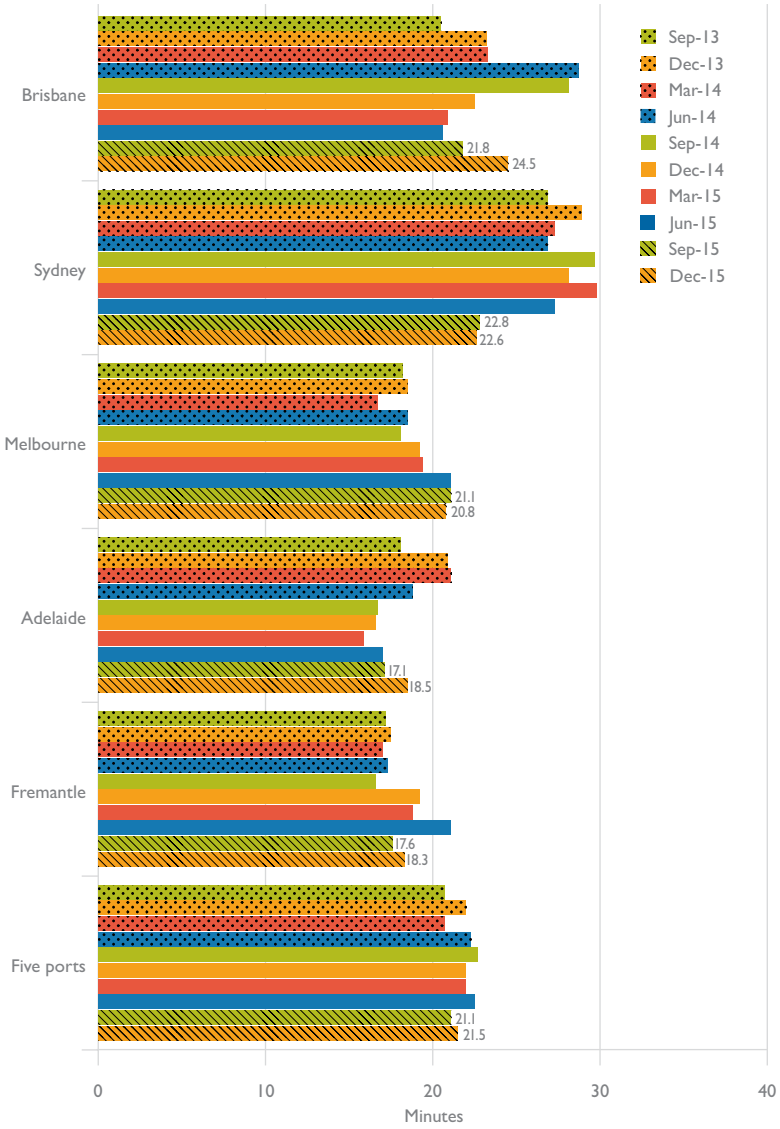
Figure 2.5 Average TEUs per truck on landside of container terminals



Notes: This indicator is based only on trucks that are processed through the VBS/TAS system.

Sources: DP World (2016), Flinders Adelaide Container Terminal (2016), Hutchison Ports Australia (2016) and Patrick (2016).

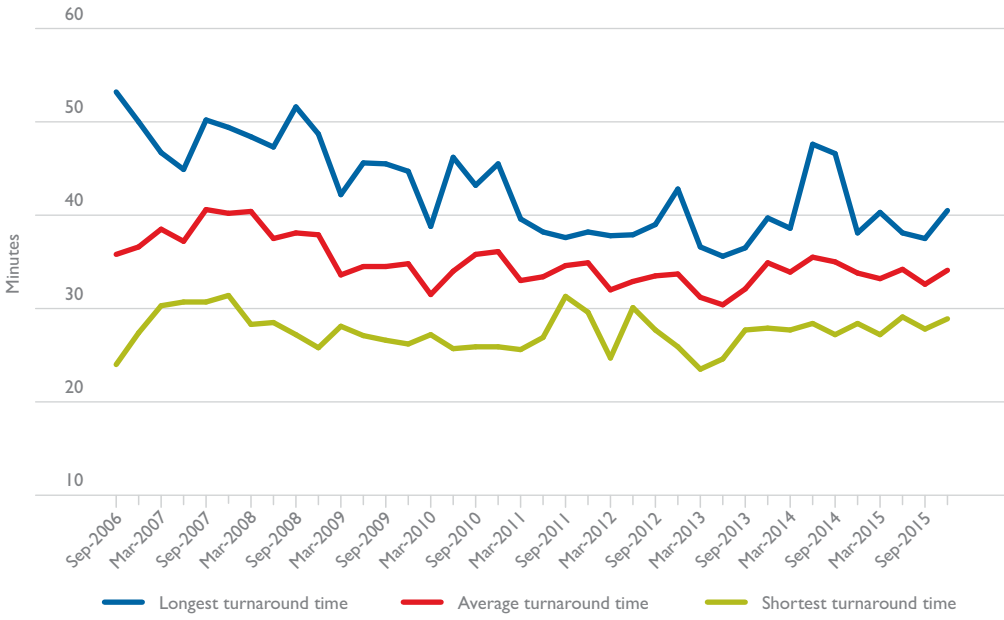
Figure 2.6 Average container turnaround time on landside of container terminals



Notes: This indicator is based only on containers that are processed through the VBS/TAS system.

Sources: DP World (2016), Flinders Adelaide Container Terminal (2016), Hutchison Ports Australia (2016) and Patrick (2016).

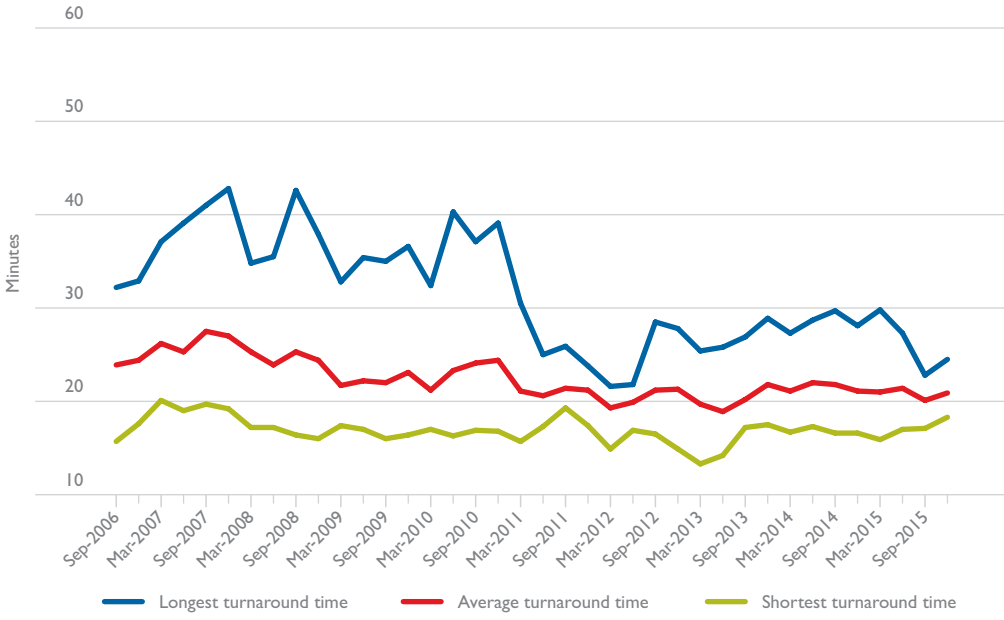
Figure 2.7 Longest and shortest truck turnaround time in five ports



Notes: The truck turnaround time is compared among all five ports in each quarter. The longest and shortest truck turnaround time may correspond to different ports in different periods.

Sources: DP World (2016), Flinders Adelaide Container Terminal (2016), Hutchison Ports Australia (2016), Patrick (2016).

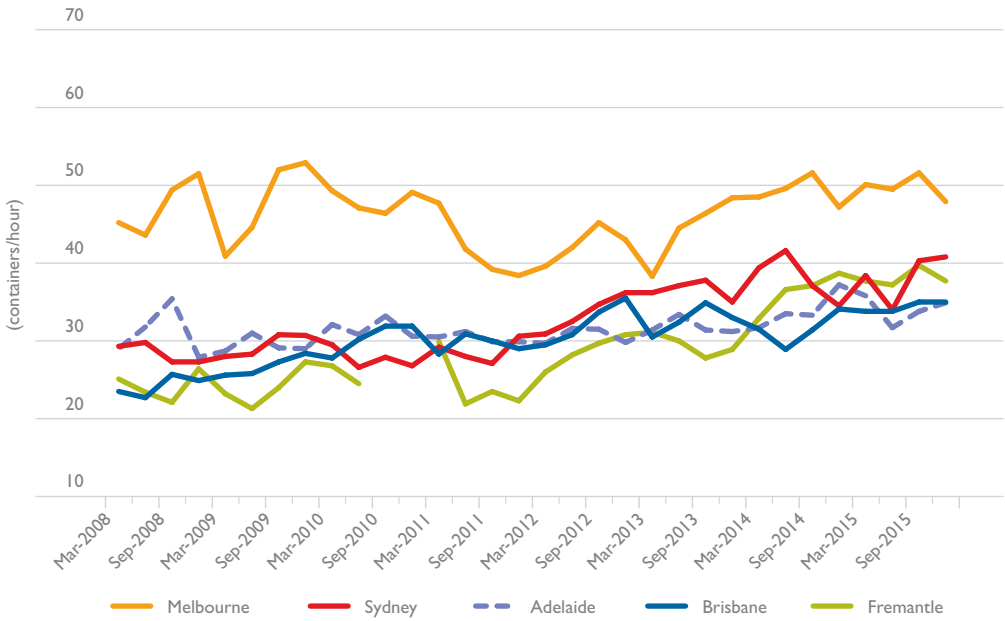
Figure 2.8 Longest and shortest container turnaround time in five ports



Notes: The container turnaround time is compared among all five ports in each quarter. The longest and shortest container turnaround time may correspond to different ports in different periods.

Sources: DP World (2016), Flinders Adelaide Container Terminal (2016), Hutchison Ports Australia (2016) and Patrick (2016).

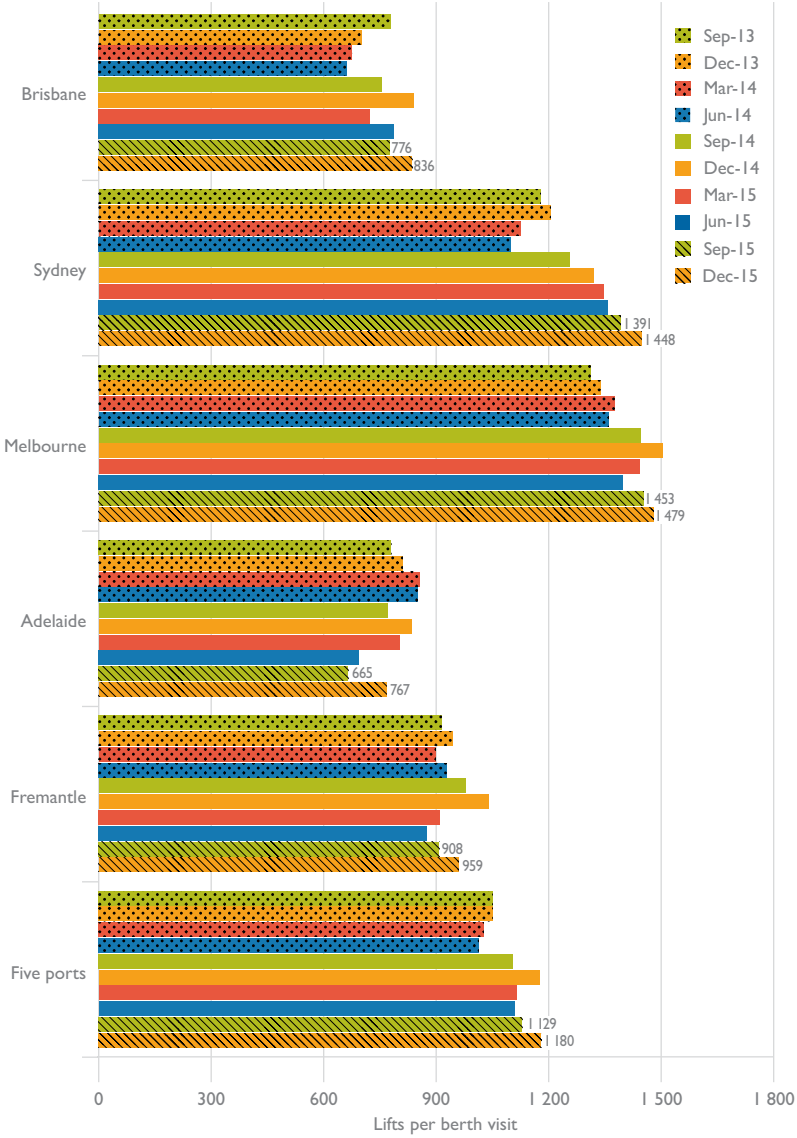
Figure 2.9 Average number of lifts per hour a ship spent at berth



Note: In the September and December quarters of 2010 only part of ship movement statistics for Fremantle was available for analysis. These data points are not plotted.

Sources: BITRE estimates based on data from Port of Brisbane Pty Ltd (2016), NSW Ports (2016), Port of Melbourne Corporation (2016), Flinders Ports (2016) and Fremantle Ports (2016).

Figure 2.10 Average number of lifts per berth visit



Sources: BITRE estimates based on data from Port of Brisbane Pty Ltd (2016), NSW Ports (2016), Port of Melbourne Corporation (2016), Flinders Ports (2016) and Fremantle Ports (2016).

Table 2.1 Container terminal productivity: Brisbane

	2013			2014						2015					
	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec
Wharfside															
Containers per hour															
Crane rate	29.1	28.3	**28.7**	29.4	27.5	**28.4**	26.7	28.0	**27.4**	27.8	29.2	**28.6**	28.3	27.6	**27.9**
Elapsed labour rate	42.1	39.9	**41.0**	34.3	31.8	**33.0**	33.9	37.3	**35.7**	38.0	38.8	**38.4**	35.8	38.4	**37.1**
Ship rate	50.4	47.4	**48.9**	43.2	40.2	**41.6**	41.5	45.4	**43.5**	45.6	46.5	**46.1**	46.0	48.6	**47.3**
TEUs per hour															
Crane rate	43.1	42.3	**42.7**	43.2	40.3	**41.7**	39.8	42.0	**40.9**	41.8	42.8	**42.3**	42.3	41.3	**41.8**
Elapsed labour rate	62.5	59.9	**61.2**	50.3	46.6	**48.4**	50.5	56.2	**53.4**	57.2	56.9	**57.0**	53.7	57.3	**55.5**
Ship rate	75.0	71.3	**73.2**	63.5	58.9	**61.1**	61.8	68.3	**65.2**	68.7	68.4	**68.5**	69.0	72.6	**70.9**
Throughput pbm	79.1	76.5	**77.8**	67.1	72.0	**69.6**	76.6	81.5	**79.1**	69.4	76.6	**73.0**	79.3	83.5	**81.4**
Landside															
Containers per truck	1.7	1.7	**1.7**	1.6	1.7	**1.6**	1.7	1.7	**1.7**	1.6	1.6	**1.6**	1.7	1.7	**1.7**
TEUs per truck	2.4	2.4	**2.4**	2.3	2.4	**2.4**	2.5	2.5	**2.5**	2.4	2.4	**2.4**	2.4	2.4	**2.4**
Per cent of trucks backloaded *(%)*							10.8	10.2	**10.5**	8.9	9.7	**9.3**	9.5	9.4	**9.5**
Truck turnaround time *(mins)*	34.1	38.4	**36.3**	37.9	47.6	**43.1**	46.6	37.7	**42.2**	34.2	33.8	**34.0**	36.0	40.5	**38.3**
Average container turnaround time *(mins)*	20.5	23.2	**21.8**	23.3	28.7	**26.2**	28.1	22.5	**25.3**	20.9	20.6	**20.7**	21.8	24.5	**23.1**
Whole of Container Terminal															
Ship turnaround time															
Median *(hours)*	30.1	28.7	**29.5**	29.2	29.4	**29.2**	30.6	30.7	**30.7**	28.2	28.9	**28.8**	27.9	30.1	**29.0**
95th percentile *(hours)*	51.0	49.3	**51.0**	51.1	52.0	**51.8**	51.8	51.6	**51.6**	44.5	45.8	**45.2**	54.5	56.8	**56.1**
Port congestion															
Number of ships waiting at anchorage for more than 2 hours	35	39	**74**	33	15	**48**	4	0	**4**	11	11	**22**	14	17	**31**
Per cent of ships waiting at anchorage for more than 2 hours *(%)*	13.8	14.7	**14.3**	13.3	5.7	**9.4**	1.6	0.0	**0.8**	4.7	4.7	**4.7**	5.7	7.1	**6.4**
Average waiting time at anchorage *(hours)*	13.1	12.6	**12.8**	12.4	10.7	**11.9**	10.8	-	**10.8**	10.0	20.0	**15.0**	18.4	14.4	**16.2**
Median of waiting time at anchorage *(hours)*	8.7	9.2	**9.1**	7.0	9.1	**7.1**	10.8	-	**10.8**	9.0	18.8	**10.1**	15.2	8.3	**11.3**
Total time ships spent at berth *('000 hours)*	5.6	5.7	**11.3**	5.3	6.0	**11.3**	6.1	5.8	**11.8**	5.1	5.5	**10.6**	5.4	5.8	**11.2**
Average TEUs per ship-hour at berth *(TEUs per hour)*	51.7	49.5	**50.6**	46.3	42.2	**44.1**	46.9	51.3	**49.0**	50.5	49.4	**49.9**	52.2	51.9	**52.0**
Average lifts per ship-hour at berth *(lifts per hour)*	34.9	33.0	**33.9**	31.5	28.9	**30.1**	31.4	34.1	**32.7**	33.8	33.8	**33.8**	35.0	35.0	**35.0**
Total time ships are available to stevedores *('000 hours)*	4.8	4.8	**9.6**	4.9	6.0	**10.9**	5.9	5.6	**11.4**	4.7	5.0	**9.7**	5.8	5.8	**11.6**
Average lifts per stevedores' hour *(lifts per hour)*	41.0	38.8	**39.9**	33.9	29.1	**31.3**	32.4	35.3	**33.8**	36.7	37.1	**36.9**	32.5	35.0	**33.7**
Average lifts per berth visit *(lifts)*	778.0	701.1	**738.6**	675.5	662.2	**668.7**	756.3	840.9	**797.0**	723.1	788.2	**755.7**	775.9	836.5	**806.0**

Note: Cells may not sum to totals due to rounding.

Blank cells mean no data was reported for the categories. Backloaded trucks were reported for the first time in Waterline 57.

Sources: DP World (2016), Hutchison Ports Australia (2016), Patrick (2016) and Port of Brisbane Pty Ltd (2016).

Table 2.2 Container terminal productivity: Sydney

	2013			2014						2015					
	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec
Wharfside															
Containers per hour															
Crane rate	30.8	30.0	**30.4**	31.7	31.5	**31.6**	30.7	30.3	**30.5**	29.6	25.4	**27.5**	27.0	28.5	**27.8**
Elapsed labour rate	45.3	40.7	**42.9**	46.8	49.1	**48.0**	46.9	40.7	**43.8**	44.3	40.0	**42.1**	46.4	46.3	**46.3**
Ship rate	53.8	47.8	**50.7**	53.9	57.6	**55.8**	53.6	48.8	**51.2**	51.5	47.4	**49.4**	53.7	50.2	**51.9**
TEUs per hour															
Crane rate	46.6	45.3	**45.9**	48.0	47.5	**47.7**	46.8	46.5	**46.6**	45.7	39.1	**42.4**	41.7	44.2	**43.0**
Elapsed labour rate	69.5	62.0	**65.6**	71.2	74.4	**72.8**	71.9	63.0	**67.4**	68.8	62.1	**65.4**	71.7	71.8	**71.8**
Ship rate	82.0	72.2	**77.0**	82.0	87.3	**84.7**	82.2	75.4	**78.8**	79.9	73.4	**76.6**	82.9	77.8	**80.3**
Throughput pbm	156.9	165.6	**161.3**	150.9	152.0	**151.4**	106.6	108.2	**107.4**	97.6	100.9	**99.2**	107.1	109.8	**108.4**
Landside															
Containers per truck	1.4	1.4	**1.4**	1.4	1.4	**1.4**	1.4	1.4	**1.4**	1.4	1.4	**1.4**	1.4	1.4	**1.4**
TEUs per truck	2.0	2.1	**2.0**	2.1	2.1	**2.1**	2.1	2.1	**2.1**	2.1	2.1	**2.1**	2.0	2.0	**2.0**
Per cent of trucks backloaded *(%)*							11.4	8.7	**10.1**	8.1	8.3	**8.2**	8.5	8.7	**8.6**
Truck turnaround time *(mins)*	36.5	39.7	**38.1**	37.2	36.6	**36.9**	40.9	38.1	**39.4**	40.3	38.1	**39.2**	32.4	32.2	**32.3**
Average container turnaround time *(mins)*	26.9	28.9	**27.9**	27.3	26.9	**27.1**	29.7	28.1	**28.9**	29.8	27.3	**28.5**	22.8	22.6	**22.7**
Whole of Container Terminal															
Ship turnaround time															
Median *(hours)*	30.0	33.6	**31.4**	28.0	25.6	**26.5**	30.4	34.2	**32.6**	32.5	34.1	**32.9**	32.1	33.9	**32.5**
95th percentile *(hours)*	53.8	58.7	**57.0**	46.9	44.9	**45.5**	60.5	68.8	**65.4**	60.3	84.5	**69.2**	60.3	57.4	**57.7**
Port congestion															
Number of ships waiting at anchorage for more than 2 hours	84	129	**213**	60	54	**114**	61	73	**134**	68	109	**177**	55	42	**97**
Per cent of ships waiting at anchorage for more than 2 hours *(%)*	29.4	43.3	**36.5**	21.1	18.4	**19.7**	21.2	26.6	**23.8**	26.2	40.8	**33.6**	19.9	15.5	**17.7**
Average waiting time at anchorage *(hours)*	14.9	15.6	**15.3**	10.4	10.0	**10.2**	10.3	15.1	**12.9**	24.7	28.2	**26.9**	15.7	12.5	**14.3**
Median of waiting time at anchorage *(hours)*	11.4	10.4	**10.7**	6.7	6.8	**6.7**	5.6	7.3	**6.4**	7.8	12.5	**9.8**	8.6	6.4	**7.4**
Total time ships spent at berth *('000 hours)*	8.9	10.3	**19.2**	8.1	7.7	**15.9**	9.7	10.5	**20.3**	9.1	10.7	**19.8**	9.6	9.6	**19.2**
Average TEUs per ship-hour at berth *(TEUs per hour)*	57.8	52.9	**55.1**	59.9	62.8	**61.3**	56.7	53.2	**54.9**	59.3	52.2	**55.5**	62.0	63.2	**62.6**
Average lifts per ship-hour at berth *(lifts per hour)*	37.8	35.0	**36.3**	39.4	41.6	**40.5**	37.1	34.5	**35.7**	38.4	34.0	**36.1**	40.3	40.8	**40.5**
Total time ships are available to stevedores *('000 hours)*	8.3	9.7	**18.0**	7.6	7.3	**14.8**	8.3	9.7	**18.0**	8.3	9.9	**18.2**	8.5	8.7	**17.2**
Average lifts per stevedores' hour *(lifts per hour)*	40.8	36.9	**38.7**	42.4	44.4	**43.4**	43.7	37.4	**40.3**	42.1	36.8	**39.2**	45.2	45.0	**45.1**
Average lifts per berth visit *(lifts)*	178.4	205.3	**192.1**	124.9	099.2	**111.9**	255.2	319.8	**286.7**	346.4	358.3	**352.4**	390.8	447.6	**418.9**

Note: Cells may not sum to totals due to rounding.

Blank cells mean no data was reported for the categories. Backloaded trucks were reported for the first time in Waterline 57.

Sources: DP World (2016), Patrick (2016), NSW Ports (2016) and Port Authority of New South Wales (2016).

Table 2.3 Container terminal productivity: Melbourne

	2013			2014						2015					
	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec
Wharfside															
Containers per hour															
Crane rate	30.7	32.4	**31.5**	32.6	32.3	**32.4**	31.7	31.6	**31.6**	32.3	31.0	**31.6**	30.5	29.8	**30.2**
Elapsed labour rate	53.4	55.2	**54.3**	55.2	53.2	**54.2**	54.2	50.1	**52.1**	53.3	52.1	**52.7**	54.3	51.8	**53.1**
Ship rate	63.3	65.6	**64.5**	66.0	64.5	**65.2**	66.1	62.3	**64.2**	64.0	61.9	**62.9**	65.4	61.8	**63.6**
TEUs per hour															
Crane rate	46.2	48.3	**47.2**	48.0	47.6	**47.8**	47.2	47.3	**47.3**	48.0	46.2	**47.1**	45.9	44.8	**45.3**
Elapsed labour rate	80.5	82.7	**81.6**	81.6	79.0	**80.2**	81.4	75.3	**78.3**	80.1	78.1	**79.1**	81.9	78.0	**80.0**
Ship rate	95.5	98.5	**97.0**	97.7	96.2	**96.9**	99.5	94.1	**96.8**	96.6	93.1	**94.8**	99.0	93.3	**96.1**
Throughput pbm	185.6	192.1	**188.8**	162.4	169.5	**165.9**	177.6	180.8	**179.2**	166.2	172.2	**169.2**	182.4	183.2	**182.8**
Landside															
Containers per truck	1.6	1.7	**1.7**	1.7	1.7	**1.7**	1.7	1.7	**1.7**	1.7	1.7	**1.7**	1.8	1.8	**1.8**
TEUs per truck	2.5	2.5	**2.5**	2.4	2.5	**2.5**	2.5	2.5	**2.5**	2.6	2.5	**2.5**	2.6	2.6	**2.6**
Per cent of trucks backloaded *(%)*							16.4	16.2	**16.3**	16.7	16.1	**16.4**	16.5	15.2	**15.9**
Truck turnaround time *(mins)*	29.9	30.8	**30.3**	28.1	31.4	**29.8**	30.8	33.0	**31.9**	33.6	36.5	**35.0**	37.5	36.5	**37.0**
Average container turnaround time *(mins)*	18.2	18.5	**18.4**	16.7	18.5	**17.6**	18.1	19.2	**18.6**	19.4	21.1	**20.2**	21.1	20.8	**21.0**
Whole of Container Terminal															
Ship turnaround time															
Median *(hours)*	36.4	34.9	**35.7**	34.5	34.8	**34.6**	34.6	38.6	**36.3**	35.6	34.3	**35.0**	35.3	37.4	**36.2**
95th percentile *(hours)*	57.5	55.8	**56.7**	54.5	52.7	**53.8**	55.1	65.9	**62.6**	52.6	59.5	**55.6**	47.9	60.3	**55.0**
Port congestion															
Number of ships waiting at anchorage for more than 2 hours	18	10	**28**	3	10	**13**	9	4	**13**	10	9	**19**	5	2	**7**
Per cent of ships waiting at anchorage for more than 2 hours *(%)*	6.4	3.5	**5.0**	1.2	3.8	**2.5**	3.4	1.5	**2.5**	4.0	3.4	**3.7**	1.9	0.8	**1.3**
Average waiting time at anchorage *(hours)*	15.8	30.1	**20.9**	16.2	17.3	**17.1**	33.1	27.2	**31.3**	20.3	29.8	**24.8**	19.4	14.8	**18.1**
Median of waiting time at anchorage *(hours)*	15.5	24.7	**17.2**	21.8	16.2	**16.7**	36.6	27.7	**29.1**	21.3	24.4	**21.5**	20.4	14.8	**20.0**
Total time ships spent at berth *('000 hours)*	7.9	7.8	**15.8**	7.4	7.3	**14.7**	7.4	8.2	**15.7**	7.2	7.5	**14.7**	7.6	8.2	**15.8**
Average TEUs per ship-hour at berth *(TEUs per hour)*	70.1	72.6	**71.3**	71.7	73.4	**72.5**	77.3	71.1	**74.1**	74.8	74.0	**74.4**	77.8	72.2	**74.9**
Average lifts per ship-hour at berth *(lifts per hour)*	46.4	48.4	**47.4**	48.5	49.6	**49.1**	51.6	47.2	**49.3**	50.1	49.5	**49.8**	51.6	47.9	**49.7**
Total time ships are available to stevedores *('000 hours)*	6.9	6.8	**13.7**	6.4	7.0	**13.5**	7.2	7.9	**15.1**	6.9	7.3	**14.2**	7.4	7.8	**15.2**
Average lifts per stevedores' hour *(lifts per hour)*	53.8	55.5	**54.7**	55.8	51.4	**53.5**	53.6	49.2	**51.3**	52.0	51.4	**51.7**	53.5	50.3	**51.8**
Average lifts per berth visit *(lifts)*	1 312.8	1 338.2	**1 325.6**	1 376.4	1 359.5	**1 367.8**	1 445.0	1 502.8	**1 473.5**	1 441.8	1 398.0	**1 419.1**	1 453.1	1 479.5	**1 466.2**

Note: Cells may not sum to totals due to rounding.

Whole of container terminal refers to East and West Swanson Docks and Webb Dock East 3, 4 and 5.

Blank cells mean no data was reported for the categories. Backloaded trucks were reported for the first time in Waterline 57.

Sources: DP World (2016), Patrick (2016) and Port of Melbourne Corporation (2016).

Table 2.4 Container terminal productivity: Adelaide

	2013			2014						2015					
	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec
Wharfside															
Containers per hour															
Crane rate	26.1	26.0	**26.1**	26.1	26.9	**26.5**	28.4	29.8	**29.1**	30.1	29.8	**30.0**	32.9	33.7	**33.3**
Elapsed labour rate	37.2	39.5	**38.3**	38.6	39.4	**39.0**	40.2	45.1	**42.7**	43.8	39.5	**41.6**	43.7	44.1	**43.9**
Ship rate	43.7	45.5	**44.6**	44.9	46.2	**45.5**	48.7	52.5	**50.6**	51.2	46.1	**48.6**	51.5	51.0	**51.2**
TEUs per hour															
Crane rate	37.0	36.0	**36.5**	35.7	36.9	**36.3**	39.8	41.9	**40.9**	42.5	42.7	**42.6**	47.1	47.6	**47.4**
Elapsed labour rate	52.7	54.7	**53.7**	52.9	54.1	**53.5**	56.5	63.4	**60.0**	61.9	56.5	**59.2**	62.7	62.2	**62.4**
Ship rate	61.9	63.1	**62.5**	61.5	63.4	**62.5**	68.3	73.9	**71.2**	72.4	66.1	**69.2**	73.8	71.9	**72.8**
Throughput pbm	113.5	115.6	**114.6**	115.9	118.0	**117.0**	108.6	112.9	**110.7**	105.1	107.2	**106.1**	108.3	124.5	**116.4**
Landside															
Containers per truck	1.8	1.8	**1.8**	1.8	1.8	**1.8**	1.8	1.7	**1.7**	1.7	1.7	**1.7**	1.7	1.8	**1.7**
TEUs per truck	2.6	2.6	**2.6**	2.6	2.5	**2.5**	2.5	2.4	**2.5**	2.4	2.5	**2.4**	2.5	2.5	**2.5**
Per cent of trucks backloaded *(%)*													24.7	26.5	**25.7**
Truck turnaround time *(mins)*	32.5	37.5	**35.0**	38.6	33.3	**35.9**	29.3	28.4	**28.9**	27.2	29.1	**28.1**	29.3	32.6	**31.0**
Average container turnaround time *(mins)*	18.1	20.9	**19.5**	21.1	18.8	**19.9**	16.7	16.6	**16.7**	15.9	17.0	**16.4**	17.1	18.5	**17.8**
Whole of Container Terminal															
Ship turnaround time															
Median *(hours)*	23.7	24.8	**24.2**	26.6	24.6	**25.5**	22.0	22.4	**22.1**	21.9	21.6	**21.8**	18.1	20.8	**20.0**
95th percentile *(hours)*	43.4	45.5	**45.5**	42.4	39.3	**39.9**	36.6	35.2	**35.8**	39.5	37.6	**38.0**	32.3	33.4	**33.0**
Port congestion															
Number of ships waiting at anchorage for more than 2 hours	9	16	**25**	8	9	**17**	5	6	**11**	2	4	**6**	5	4	**9**
Per cent of ships waiting at anchorage for more than 2 hours *(%)*	10.5	18.6	**14.5**	9.9	11.0	**10.4**	5.9	7.4	**6.6**	2.6	4.4	**3.6**	5.1	4.1	**4.6**
Average waiting time at anchorage *(hours)*	16.3	17.2	**16.9**	23.2	22.4	**22.8**	18.8	12.1	**15.1**	16.4	29.9	**25.4**	17.5	21.8	**19.4**
Median of waiting time at anchorage *(hours)*	19.0	16.8	**16.8**	17.8	13.1	**13.1**	13.3	6.2	**8.2**	16.4	28.0	**22.7**	14.8	16.3	**14.8**
Total time ships spent at berth *('000 hours)*	2.1	2.2	**4.4**	2.2	2.1	**4.3**	2.0	1.8	**3.8**	1.7	2.0	**3.7**	1.9	2.1	**4.1**
Average TEUs per ship-hour at berth *(TEUs per hour)*	44.5	43.2	**43.8**	43.4	46.1	**44.7**	46.7	52.3	**49.4**	50.6	45.4	**47.8**	48.4	49.2	**48.8**
Average lifts per ship-hour at berth *(lifts per hour)*	31.4	31.2	**31.3**	31.7	33.5	**32.6**	33.3	37.2	**35.2**	35.8	31.7	**33.6**	33.8	34.9	**34.3**
Total time ships are available to stevedores *('000 hours)*	1.8	1.8	**3.6**	1.8	1.8	**3.6**	1.6	1.5	**3.1**	1.4	1.6	**3.1**	1.5	1.7	**3.2**
Average lifts per stevedores' hour *(lifts per hour)*	36.6	39.6	**38.1**	38.5	38.8	**38.6**	40.4	45.0	**42.6**	42.9	39.2	**40.9**	43.8	43.9	**43.9**
Average lifts per berth visit *(lifts)*	779.9	810.2	**795.0**	854.9	850.5	**852.7**	770.2	833.8	**801.2**	802.0	694.0	**743.3**	665.0	766.8	**715.7**

Note: Cells may not sum to totals due to rounding.

Blank cells mean no data was reported for the categories. Backloaded trucks were reported for the first time in Waterline 57.

Sources: Flinders Adelaide Container Terminal (2016) and Flinders Ports (2016).

Table 2.5 Container terminal productivity: Fremantle

	2013			2014						2015					
	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec
Wharfside															
Containers per hour															
Crane rate	31.1	31.1	**31.1**	33.0	35.6	**34.3**	35.6	36.0	**35.8**	37.1	37.0	**37.0**	34.7	34.3	**34.5**
Elapsed labour rate	30.3	33.1	**31.8**	38.1	41.1	**39.6**	43.5	44.9	**44.2**	44.9	42.8	**43.9**	44.1	43.3	**43.7**
Ship rate	35.8	38.6	**37.3**	45.0	51.1	**48.1**	50.3	52.5	**51.4**	51.6	50.9	**51.3**	52.7	49.6	**51.1**
TEUs per hour															
Crane rate	46.3	46.6	**46.5**	48.2	50.8	**49.5**	52.1	53.5	**52.8**	54.5	54.9	**54.7**	51.6	51.1	**51.4**
Elapsed labour rate	45.2	49.6	**47.5**	55.6	58.5	**57.1**	63.3	66.5	**64.9**	65.7	63.4	**64.6**	66.0	64.9	**65.5**
Ship rate	53.4	57.6	**55.6**	65.8	73.1	**69.4**	73.6	78.0	**75.9**	75.9	75.8	**75.9**	79.2	74.6	**76.8**
Throughput pbm	87.5	97.6	**92.5**	88.9	91.6	**90.3**	101.2	103.5	**102.4**	89.8	87.9	**88.9**	92.2	99.0	**95.6**
Landside															
Containers per truck	1.6	1.6	**1.6**	1.6	1.6	**1.6**	1.6	1.6	**1.6**	1.6	1.6	**1.6**	1.6	1.6	**1.6**
TEUs per truck	2.3	2.3	**2.3**	2.3	2.3	**2.3**	2.3	2.4	**2.3**	2.4	2.3	**2.3**	2.3	2.3	**2.3**
Per cent of trucks backloaded *(%)*							10.5	12.0	**11.3**	12.7	11.4	**12.1**	11.0	11.1	**11.1**
Truck turnaround time *(mins)*	27.7	27.9	**27.8**	27.7	28.4	**28.0**	27.2	31.7	**29.5**	30.5	33.3	**31.9**	27.8	28.9	**28.3**
Average container turnaround time *(mins)*	17.2	17.5	**17.4**	17.0	17.3	**17.1**	16.6	19.2	**17.9**	18.8	21.1	**19.9**	17.6	18.3	**17.9**
Whole of Container Terminal															
Ship turnaround time															
Median *(hours)*	33.9	34.1	**33.9**	30.6	26.6	**28.4**	28.1	28.5	**28.4**	25.2	25.1	**25.2**	23.9	27.5	**25.2**
95th percentile *(hours)*	79.1	67.0	**73.4**	51.7	44.5	**50.1**	49.9	54.4	**54.4**	49.0	43.9	**46.8**	44.7	61.6	**50.9**
Port congestion															
Number of ships waiting at anchorage for more than 2 hours	9	10	**19**	6	1	**7**	2	4	**6**	2	4	**6**	6	5	**11**
Per cent of ships waiting at anchorage for more than 2 hours *(%)*	7.3	7.8	**7.5**	4.7	0.8	**2.8**	1.5	3.2	**2.3**	1.6	3.1	**2.4**	4.6	3.9	**4.2**
Average waiting time at anchorage *(hours)*	17.2	9.2	**13.0**	11.4	9.7	**11.2**	14.9	22.3	**19.8**	16.4	9.8	**12.0**	13.7	28.1	**20.2**
Median of waiting time at anchorage *(hours)*	8.1	6.8	**7.2**	8.2	9.7	**9.7**	14.9	22.3	**15.4**	16.4	5.9	**7.7**	11.7	23.8	**11.7**
Total time ships spent at berth *('000 hours)*	4.1	4.2	**8.3**	3.5	3.2	**6.7**	3.5	3.4	**6.9**	3.0	3.0	**6.1**	3.0	3.3	**6.3**
Average TEUs per ship-hour at berth *(TEUs per hour)*	41.3	43.1	**42.2**	48.0	52.4	**50.1**	54.4	57.7	**56.0**	55.8	55.7	**55.7**	59.6	56.7	**58.1**
Average lifts per ship-hour at berth *(lifts per hour)*	27.8	28.9	**28.3**	32.9	36.6	**34.6**	37.1	38.7	**37.9**	37.7	37.2	**37.5**	39.7	37.7	**38.6**
Total time ships are available to stevedores *('000 hours)*	3.7	3.8	**7.6**	3.0	2.9	**6.0**	3.1	3.1	**6.2**	2.7	2.7	**5.4**	2.7	3.0	**5.7**
Average lifts per stevedores' hour *(lifts per hour)*	30.2	31.7	**31.0**	38.2	39.6	**38.9**	41.8	42.8	**42.3**	42.5	41.4	**42.0**	44.4	42.0	**43.2**
Average lifts per berth visit *(lifts)*	915.3	944.0	**930.0**	898.0	929.4	**913.6**	978.0	1 040.0	**1 008.2**	909.8	874.8	**892.2**	907.6	959.0	**933.1**

Note: Cells may not sum to totals due to rounding.

Blank cells mean no data was reported for the categories. Backloaded trucks were reported for the first time in Waterline 57.

Sources: DP World (2016), Patrick (2016) and Fremantle Ports (2016).

Table 2.6 Container terminal productivity: Five ports

	2013			2014						2015					
	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec
Wharfside															
Containers per hour															
Crane rate	30.2	30.4	**30.3**	31.4	31.3	**31.3**	30.8	30.9	**30.9**	31.1	29.4	**30.2**	29.5	29.7	**29.6**
Elapsed labour rate	45.4	44.4	**44.9**	46.2	46.2	**46.2**	46.5	44.0	**45.2**	46.4	44.2	**45.3**	46.9	46.3	**46.6**
Ship rate	53.9	52.5	**53.2**	54.7	55.7	**55.2**	55.1	53.3	**54.2**	54.8	52.4	**53.6**	56.1	53.8	**54.9**
TEUs per hour															
Crane rate	45.3	45.4	**45.3**	46.5	46.1	**46.3**	46.0	46.5	**46.3**	46.6	43.9	**45.3**	44.5	44.8	**44.7**
Elapsed labour rate	68.5	66.7	**67.6**	68.6	68.5	**68.6**	69.8	66.3	**68.0**	70.0	66.5	**68.2**	71.1	70.2	**70.6**
Ship rate	81.2	78.6	**79.9**	81.4	82.8	**82.1**	83.0	80.6	**81.8**	82.9	79.1	**80.9**	85.2	81.4	**83.3**
Throughput pbm	127.8	132.5	**130.1**	119.0	122.9	**120.9**	113.9	116.9	**115.4**	104.9	109.0	**106.9**	114.6	118.6	**116.6**
Landside															
Containers per truck	1.6	1.6	**1.6**	1.6	1.6	**1.6**	1.6	1.6	**1.6**	1.6	1.6	**1.6**	1.6	1.6	**1.6**
TEUs per truck	2.3	2.3	**2.3**	2.3	2.3	**2.3**	2.4	2.4	**2.4**	2.4	2.3	**2.3**	2.4	2.3	**2.4**
Per cent of trucks backloaded *(%)*							n.a.	n.a.	**n.a.**	n.a.	n.a.	**n.a.**	12.3	12.1	**12.2**
Truck turnaround time *(mins)*	32.4	34.7	**33.6**	32.9	35.5	**34.2**	36.1	35.0	**35.5**	35.0	35.8	**35.4**	34.1	34.6	**34.4**
Average container turnaround time *(mins)*	20.7	22.0	**21.3**	20.7	22.3	**21.5**	22.7	22.0	**22.3**	22.0	22.5	**22.3**	21.1	21.5	**21.3**
Whole of Container Terminal															
Ship turnaround time															
Median *(hours)*	n.a.	n.a.	**n.a.**	n.a.	n.a.	**n.a.**	n.a.	n.a.	**n.a.**	n.a.	n.a.	**n.a.**	n.a.	n.a.	**n.a.**
95th percentile *(hours)*	n.a.	n.a.	**n.a.**	n.a.	n.a.	**n.a.**	n.a.	n.a.	**n.a.**	n.a.	n.a.	**n.a.**	n.a.	n.a.	**n.a.**
Port congestion															
Number of ships waiting at anchorage for more than 2 hours	155	204	**359**	110	89	**199**	81	87	**168**	93	137	**230**	85	70	**155**
Per cent of ships waiting at anchorage for more than 2 hours *(%)*	15.1	19.2	**17.2**	11.0	8.7	**9.8**	7.9	8.9	**8.4**	9.8	13.8	**11.9**	8.3	7.0	**7.7**
Average waiting time at anchorage *(hours)*	14.8	15.5	**15.2**	12.1	12.2	**12.2**	13.5	15.8	**14.7**	22.1	27.2	**25.1**	16.3	14.6	**15.5**
Median of waiting time at anchorage *(hours)*	11.4	11.2	**11.3**	7.1	9.2	**8.0**	8.2	8.2	**8.2**	8.8	13.2	**10.6**	11.7	8.4	**10.0**
Total time ships spent at berth *('000 hours)*	28.7	30.2	**58.9**	26.6	26.3	**52.9**	28.7	29.7	**58.4**	26.1	28.7	**54.8**	27.6	29.0	**56.6**
Average TEUs per ship-hour at berth *(TEUs per hour)*	56.7	55.3	**56.0**	57.5	58.4	**58.0**	59.0	58.3	**58.6**	60.9	57.3	**59.0**	63.3	61.7	**62.5**
Average lifts per ship-hour at berth *(lifts per hour)*	37.7	37.0	**37.3**	38.8	39.6	**39.2**	39.4	38.6	**39.0**	40.5	38.2	**39.3**	41.8	40.9	**41.3**
Total time ships are available to stevedores *('000 hours)*	25.5	27.0	**52.5**	23.8	25.0	**48.8**	26.0	27.8	**53.8**	24.0	26.5	**50.5**	25.9	26.9	**52.8**
Average lifts per stevedores' hour *(lifts per hour)*	42.5	41.4	**41.9**	43.4	41.7	**42.5**	43.4	41.3	**42.3**	44.0	41.5	**42.7**	44.5	44.0	**44.3**
Average lifts per berth visit *(lifts)*	1 051.5	1 050.7	**1 051.1**	1 027.5	1 013.7	**1 020.5**	1 105.1	1 176.4	**1 139.8**	1 114.0	1 108.9	**1 111.4**	1 128.5	1 180.3	**1 154.2**

Note: Cells may not sum to totals due to rounding. n.a.: not applicable.

Blank cells mean no data was reported for the categories. Backloaded trucks were reported for the first time in Waterline 57.

Sources: DP World (2016), Patrick (2016), Hutchison Ports Australia (2016), Flinders Adelaide Container Terminal (2016), Port of Brisbane Pty Ltd (2016), Maritime Safety Queensland (2016), Port Authority of New South Wales (2016), NSW Ports (2016), Port of Melbourne Corporation (2016), Flinders Ports (2016) and Fremantle Ports (2016).

CHAPTER 3
Timeslots for trucks at container terminals

Overview

This chapter reports on two main indicator types:

1. The number of truck booking or appointment timeslots available at a container terminal
2. The number of truck booking or appointment timeslots used at a container terminal

The data is derived from the vehicle booking systems used by stevedores. An important use of these statistics is to monitor the time of day and week when trucks access the container terminals to pick up or deliver containers. For this reason the count of slots available and used are provided for the following windows:

Monday to Friday Day: 6:01 AM to 6:00 PM

Monday to Friday Evening: 6:01 PM to 12:00 Midnight

Monday to Friday Night: 12:01 Midnight to 6:00 AM

Saturday Day: 6:01 AM to 6:00 PM

Saturday Evening: 6:01 PM to 12:00 Midnight

Saturday Night: 12:01 Midnight to 6:00 AM

Sunday Day: 6:01 AM to 6:00 PM

Sunday Evening: 6:01 PM to 12:00 Midnight

Sunday Night: 12:01 Midnight to 6:00 AM

The stevedores at the five container terminals do not have identical day, evening and night shifts. Thus data has been adjusted to fit into these standardised work shifts for comparative purposes.

Indicator 3.1 Number of truck timeslots available

Stevedoring companies make available a number of truck timeslots at various times in each day, based on the deployment of container handling equipment. The main factors affecting the availability of truck timeslots are the volume of containers to be processed, and terminal resources available to process containers. When shipping schedules and container volumes demand extra resources, additional labour and extra equipment can be deployed to the landside of a container terminal and extra available timeslots are advertised normally one or two days in advance.

Indicator 3.2 Number of timeslots actually used

This is the count of timeslots actually used by trucks.

Indicator 3.3 Timeslots used by trucks in all off-peak periods as per cent of total timeslots used at container terminals

This indicator, derived from Indicator 3.2, gives the count of timeslots used by trucks during the off-peak period as a per cent of all timeslots used. The off-peak period is defined as all time periods except Monday to Friday 6:01 AM to 6:00 PM.

Results for this indicator are presented in Figure 3.1. The indicator is further divided up into Monday to Friday off-peak usage (Indicator 3.4) and week-end usage (Indicator 3.5).

Indicator 3.4 Timeslots used by trucks in Monday to Friday off-peak periods as per cent of total timeslots used

This indicator, derived from Indicator 3.2, gives a count of timeslots used by trucks during the Monday to Friday off-peak period as a per cent of all timeslots used. Results for this indicator are presented in Figure 3.2.

Indicator 3.5 Timeslots used by trucks on Saturday and Sunday as per cent of total timeslots used

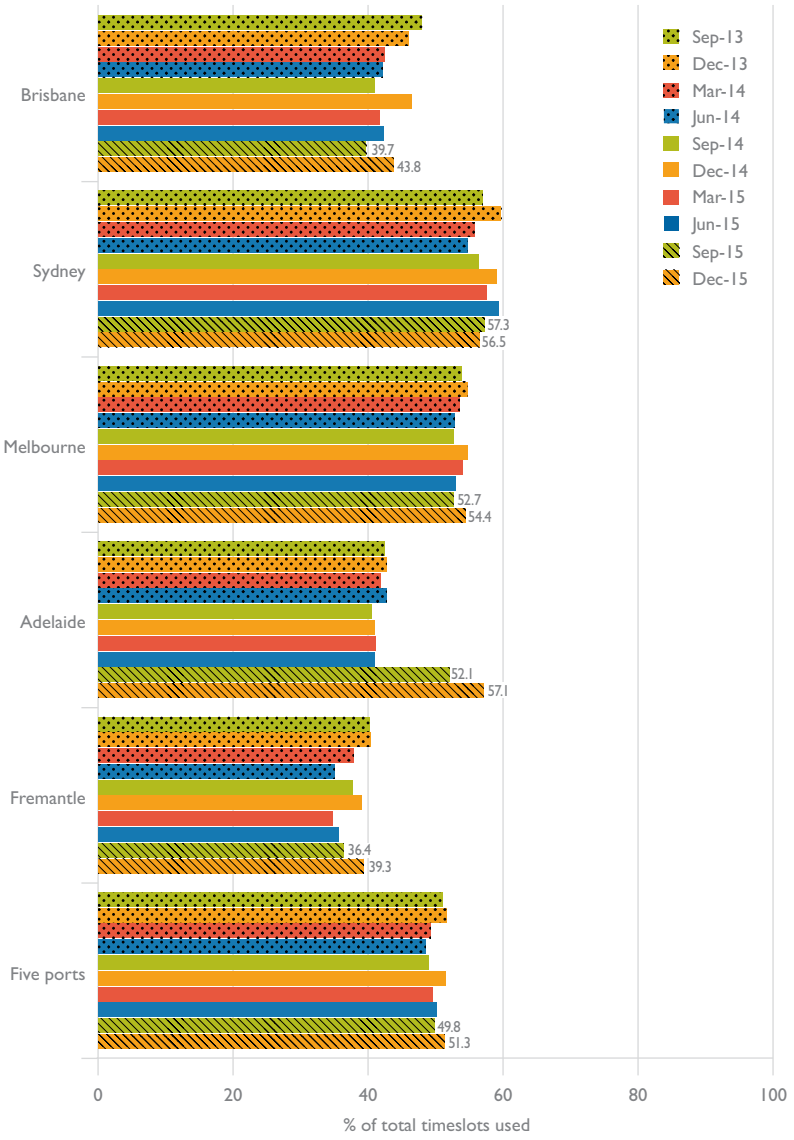
This indicator, derived from indicator 3.2, gives a count of timeslots used by trucks during the Weekend (Saturday to Sunday) as a per cent of all timeslots used. Results for this indicator are presented in Figure 3.3.

Indicator 3.6 Average TEUs handled per VBS/TAS truck timeslot

This indicator is a measure of the intensity of usage of timeslots. The indicator increases as opportunities for out/return load carrying trips in one job increase. Results for this indicator are presented in Figure 3.4.

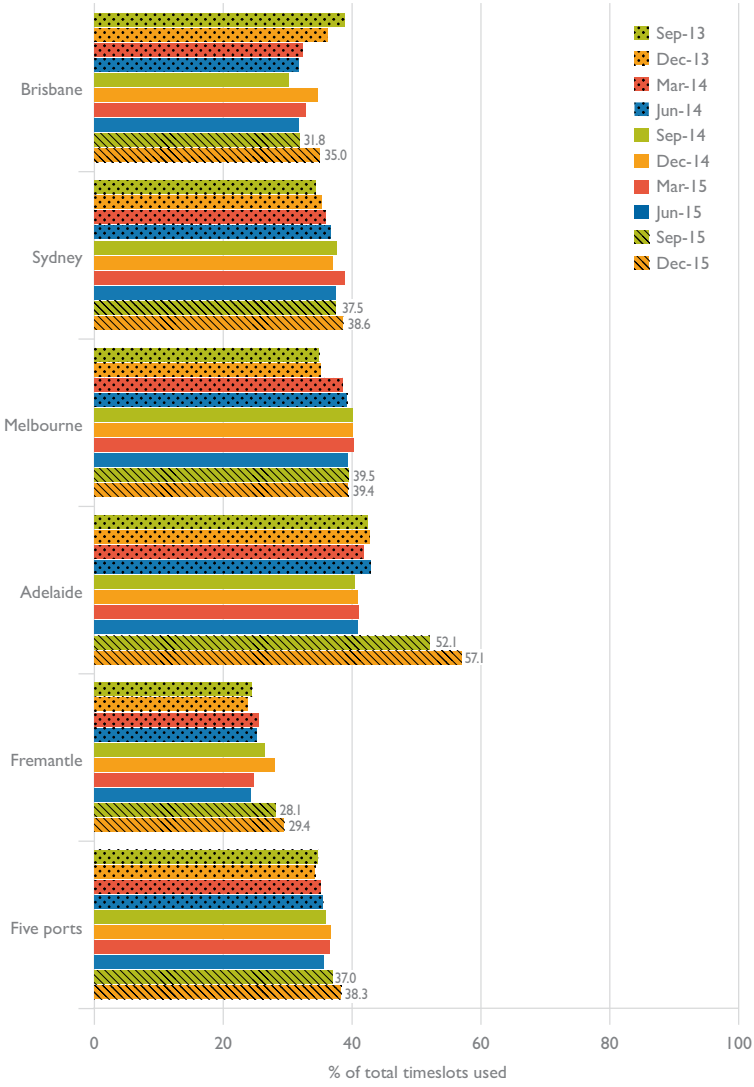
Road train lanes at Flinders Adelaide Container Terminal. Photo courtesy of Flinders Adelaide Container Terminal.

Figure 3.1 Timeslots used by trucks in all off-peak periods



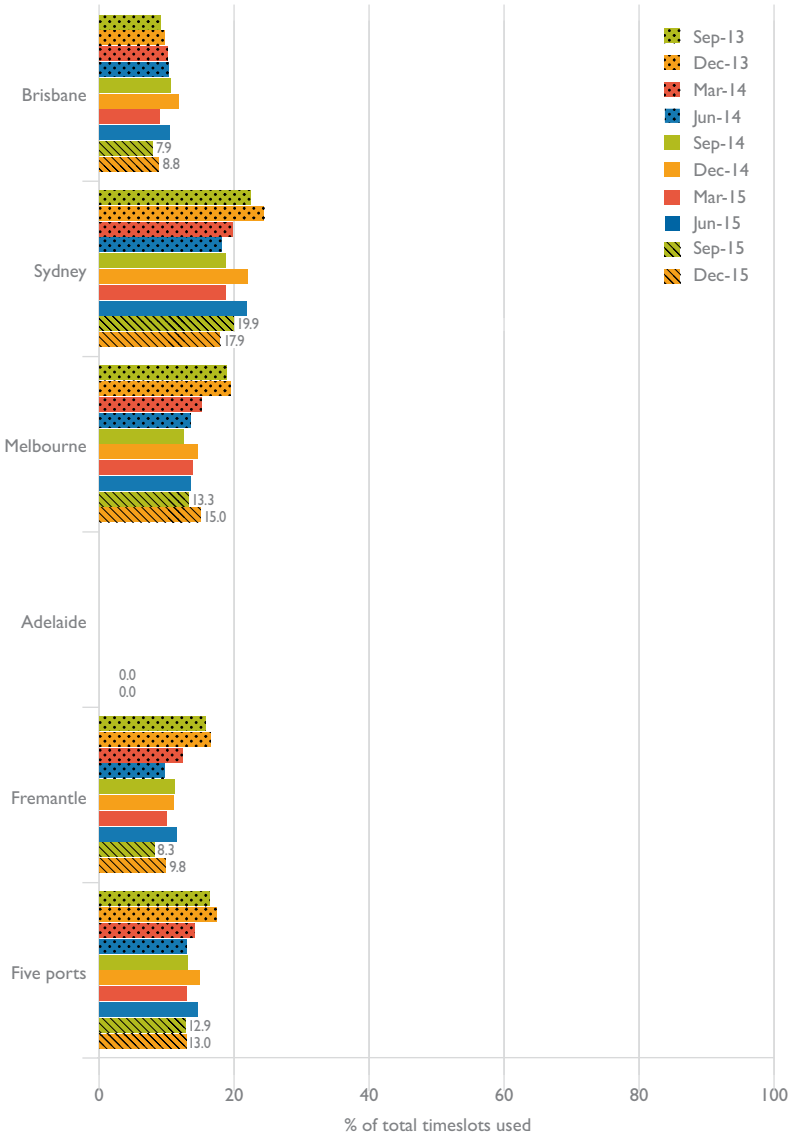
Sources: DP World (2016), Flinders Adelaide Container Terminal (2016), Hutchison Ports Australia (2016) and Patrick (2016).

Figure 3.2 Timeslots used by trucks in off-peak periods Monday to Friday



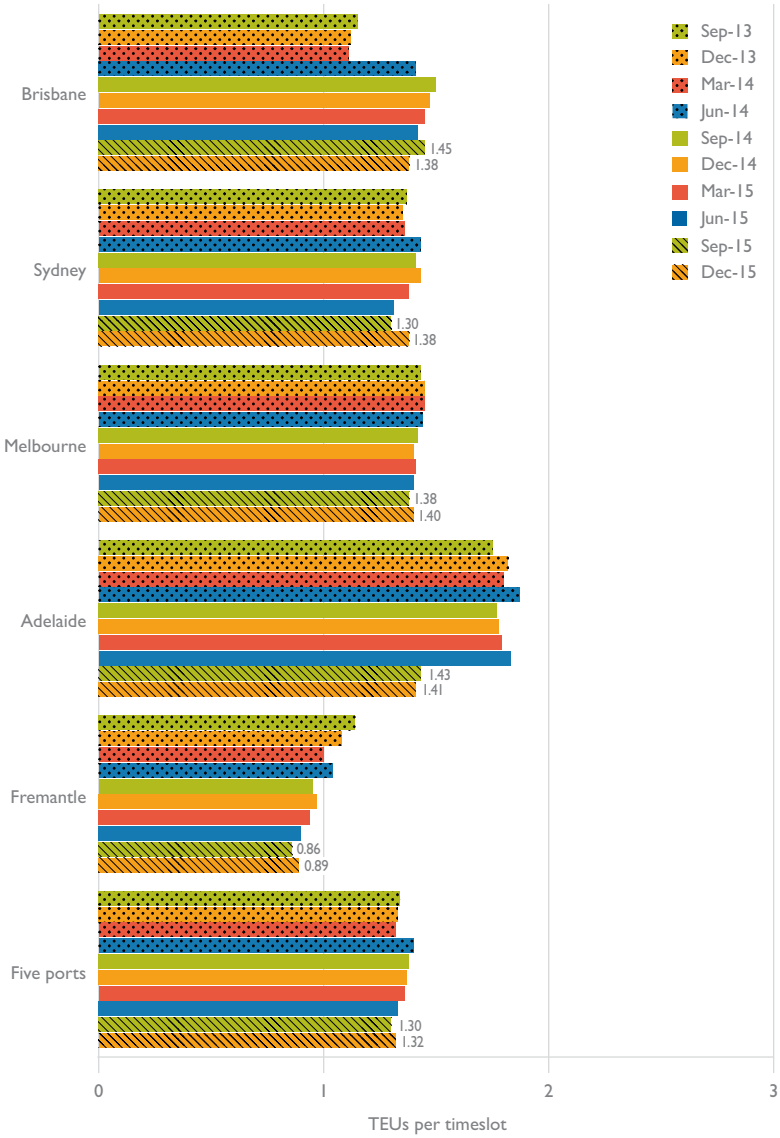
Sources: DP World (2016), Flinders Adelaide Container Terminal (2016), Hutchison Ports Australia (2016) and Patrick (2016).

Figure 3.3 Timeslots used by trucks on Saturday and Sunday



Sources: DP World (2016), Flinders Adelaide Container Terminal (2016), Hutchison Ports Australia (2016) and Patrick (2016).

Figure 3.4 TEUs processed per VBS truck at container terminals



Sources: DP World (2016), Flinders Adelaide Container Terminal (2016), Hutchison Ports Australia (2016) and Patrick (2016).

Table 3.1 Timeslots available and actually used by trucks: Brisbane

			2013		2014				2015			
	Weekday	Shift	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr
Available timeslots	Monday – Friday	Day	94.3	99.4	94.4	100.7	90.2	83.0	78.1	86.7	82.6	81.0
('000)		Evening	38.3	37.7	33.5	37.5	31.7	32.6	30.6	32.5	26.4	28.2
		Night	30.5	28.0	19.4	20.8	14.2	20.4	14.3	15.7	16.3	21.5
		Sub-total	**163.1**	**165.2**	**147.4**	**159.0**	**136.1**	**136.0**	**123.0**	**134.9**	**125.3**	**130.6**
	Saturday	Day	10.5	12.4	11.5	12.8	11.2	10.3	8.7	11.5	10.2	8.3
		Evening	0.4	0.0	1.9	2.2	2.0	2.3	2.9	2.3	1.7	0.1
		Night	0.2	0.6	0.0	0.9	0.0	1.4	0.5	0.6	0.6	1.6
		Sub-total	**11.1**	**13.0**	**13.4**	**15.8**	**13.3**	**14.0**	**12.0**	**14.4**	**12.4**	**10.0**
	Sunday	Day	5.1	4.0	5.7	6.7	4.4	5.0	2.6	4.4	2.5	2.0
		Evening	0.6	0.2	0.5	0.6	0.5	0.0	0.4	0.5	0.1	0.0
		Night	2.1	1.9	1.9	1.4	0.9	0.8	0.5	0.7	0.9	0.8
		Sub-total	**7.8**	**6.1**	**8.0**	**8.7**	**5.8**	**5.8**	**3.5**	**5.6**	**3.5**	**2.9**
	Total available timeslots		**181.9**	**184.2**	**168.8**	**183.5**	**155.2**	**155.7**	**138.6**	**154.9**	**141.2**	**143.5**
Used timeslots	Monday – Friday	Day	87.4	92.3	87.8	83.6	85.0	77.2	73.0	78.8	76.6	73.6
('000)		Evening	36.2	35.3	31.9	29.9	29.8	29.3	27.3	28.8	24.7	25.5
		Night	29.2	26.6	17.3	15.9	13.7	20.8	13.8	14.6	15.8	20.4
		Sub-total	**152.9**	**154.2**	**137.0**	**129.4**	**128.6**	**127.3**	**114.1**	**122.2**	**117.1**	**119.5**
	Saturday	Day	9.1	11.2	9.5	9.7	9.7	8.7	7.1	9.6	8.0	7.1
		Evening	0.1	0.0	1.7	1.2	1.3	1.4	2.3	1.4	0.5	0.1
		Night	0.2	0.5	0.0	0.8	0.0	1.8	0.4	0.6	0.5	1.5
		Sub-total	**9.4**	**11.7**	**11.2**	**11.6**	**11.0**	**11.8**	**9.7**	**11.6**	**9.0**	**8.7**
	Sunday	Day	3.8	3.4	2.7	2.6	3.1	3.6	0.8	2.2	0.4	1.9
		Evening	0.4	0.1	0.3	0.1	0.3	0.0	0.3	0.0	0.0	0.0
		Night	1.8	1.5	1.2	0.7	0.8	1.5	0.4	0.6	0.7	0.8
		Sub-total	**5.9**	**4.9**	**4.2**	**3.3**	**4.3**	**5.1**	**1.5**	**2.8**	**1.0**	**2.7**
	Total used timeslots		**168.2**	**170.9**	**152.4**	**144.4**	**143.9**	**144.2**	**125.3**	**136.5**	**127.1**	**131.0**

Note: Data are rounded to the nearest 1000. Cells with an entry of "0.0" mean that data were reported but rounded to zero.

Sources: DP World (2016), Hutchison Ports Australia (2015) and Patrick (2016).

Table 3.2 Timeslots available and actually used by trucks: Sydney

			2013		2014				2015			
	Weekday	Shift	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr
Available timeslots	Monday – Friday	Day	95.0	97.6	101.8	109.0	110.7	104.6	99.3	111.5	131.4	128.1
('000)		Evening	43.9	44.1	44.4	50.4	53.1	50.3	49.3	53.8	58.4	53.9
		Night	35.5	37.3	34.9	39.4	44.1	46.7	44.8	48.8	49.1	47.2
		Sub-total	**174.4**	**179.0**	**181.2**	**198.7**	**207.9**	**201.6**	**193.4**	**214.1**	**238.8**	**229.2**
	Saturday	Day	11.8	15.9	14.4	16.7	17.2	20.5	16.9	21.5	19.6	21.5
		Evening	3.4	4.0	1.3	2.0	2.3	4.0	2.1	3.9	2.9	1.6
		Night	6.6	7.2	3.8	3.9	4.1	5.7	5.1	6.6	6.4	5.5
		Sub-total	**21.7**	**27.1**	**19.5**	**22.7**	**23.6**	**30.1**	**24.0**	**32.0**	**28.9**	**28.7**
	Sunday	Day	16.8	17.1	13.0	13.3	12.1	14.1	9.7	14.9	13.8	12.0
		Evening	8.2	8.1	6.8	6.4	7.3	7.5	6.4	7.5	7.8	7.0
		Night	3.6	4.0	3.4	2.9	4.0	5.1	3.8	4.6	5.5	3.2
		Sub-total	**28.6**	**29.2**	**23.2**	**22.7**	**23.4**	**26.8**	**20.0**	**27.0**	**27.1**	**22.2**
	Total available timeslots		**224.8**	**235.3**	**223.9**	**244.1**	**255.0**	**258.6**	**237.4**	**273.1**	**294.8**	**280.1**
Used timeslots	Monday – Friday	Day	90.3	86.5	85.7	95.2	102.3	95.5	88.5	97.6	106.4	101.7
('000)		Evening	41.5	42.1	41.0	44.6	49.3	45.2	43.3	48.0	49.6	47.9
		Night	30.4	33.6	28.8	32.7	39.1	41.1	37.9	42.3	43.8	42.4
		Sub-total	**162.1**	**162.2**	**155.5**	**172.5**	**190.7**	**181.8**	**169.8**	**187.9**	**199.9**	**192.1**
	Saturday	Day	11.3	14.4	11.4	13.8	15.6	18.8	14.7	18.3	16.1	14.8
		Evening	3.0	3.8	1.1	1.2	2.0	3.0	1.6	3.2	2.2	1.3
		Night	5.9	6.5	3.6	3.4	3.9	5.1	4.6	6.1	6.2	5.4
		Sub-total	**20.2**	**24.7**	**16.0**	**18.4**	**21.5**	**26.9**	**21.0**	**27.6**	**24.5**	**21.5**
	Sunday	Day	15.8	16.4	12.6	11.4	11.7	12.7	9.2	14.4	13.4	11.3
		Evening	7.7	7.6	6.6	5.8	7.2	7.1	5.8	7.0	7.2	6.5
		Night	3.4	3.8	3.1	2.5	3.5	4.4	3.1	3.7	4.5	2.6
		Sub-total	**26.9**	**27.7**	**22.4**	**19.7**	**22.4**	**24.2**	**18.1**	**25.1**	**25.1**	**20.4**
	Total used timeslots		**209.2**	**214.6**	**193.9**	**210.6**	**234.6**	**233.0**	**208.8**	**240.5**	**249.4**	**234.0**

Sources: DP World (2016), Hutchison Ports Australia (2016) and Patrick (2016).

Table 3.3 Timeslots available and actually used by trucks: Melbourne

			2013		2014				2015			
	Weekday	Shift	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr
Available timeslots	Monday – Friday	Day	150.2	147.3	143.1	150.7	159.5	152.0	143.2	140.9	145.8	133.9
('000)		Evening	65.4	65.7	66.6	71.7	74.6	72.6	68.4	65.4	66.4	62.1
		Night	50.4	51.7	55.8	56.8	61.4	62.9	57.4	52.8	55.6	54.9
		Sub-total	**266.0**	**264.7**	**265.5**	**279.3**	**295.5**	**287.5**	**269.0**	**259.1**	**267.8**	**250.9**
	Saturday	Day	17.5	18.4	20.9	20.4	18.7	20.3	19.4	17.7	18.5	19.1
		Evening	4.6	5.6	1.8	0.8	0.6	0.5	0.3	0.4	0.3	0.6
		Night	10.7	11.1	4.0	3.9	4.6	5.5	5.9	5.0	4.8	4.6
		Sub-total	**32.8**	**35.0**	**26.8**	**25.1**	**23.9**	**26.3**	**25.5**	**23.2**	**23.7**	**24.3**
	Sunday	Day	15.3	14.8	9.2	6.9	5.8	8.9	6.2	7.8	6.3	9.1
		Evening	8.7	8.1	6.1	6.2	6.7	8.0	7.3	6.1	6.7	6.7
		Night	7.3	8.0	6.3	5.7	6.2	7.1	5.0	4.6	5.2	5.0
		Sub-total	**31.2**	**30.9**	**21.6**	**18.8**	**18.7**	**23.9**	**18.5**	**18.5**	**18.2**	**20.7**
	Total available timeslots		**330.1**	**330.6**	**313.8**	**323.2**	**338.0**	**337.8**	**313.1**	**300.8**	**309.6**	**296.0**
Used timeslots	Monday – Friday	Day	146.3	143.1	138.5	146.8	156.7	148.7	139.6	137.8	143.0	131.3
('000)		Evening	63.1	63.0	63.4	69.0	73.1	70.9	66.7	63.8	64.9	60.4
		Night	47.4	47.8	51.6	53.0	59.6	61.1	55.5	51.3	54.5	52.9
		Sub-total	**256.8**	**254.0**	**253.4**	**268.7**	**289.4**	**280.6**	**261.8**	**252.9**	**262.3**	**244.6**
	Saturday	Day	16.8	17.7	20.1	19.9	18.2	19.4	18.5	17.1	17.8	18.5
		Evening	4.3	5.4	1.5	0.7	0.6	0.5	0.2	0.4	0.3	0.6
		Night	9.0	9.2	3.5	3.8	4.5	5.4	5.6	5.0	4.8	4.5
		Sub-total	**30.1**	**32.3**	**25.1**	**24.4**	**23.4**	**25.3**	**24.4**	**22.4**	**22.9**	**23.5**
	Sunday	Day	14.6	14.2	8.7	6.6	5.6	8.6	6.0	7.5	6.1	8.8
		Evening	8.3	7.7	5.7	6.0	6.6	7.8	7.0	5.7	6.5	6.3
		Night	6.8	7.4	5.7	5.2	5.8	6.6	4.6	4.1	4.8	4.5
		Sub-total	**29.7**	**29.3**	**20.1**	**17.9**	**18.0**	**22.9**	**17.6**	**17.4**	**17.3**	**19.6**
	Total used timeslots		**316.5**	**315.6**	**298.7**	**311.0**	**330.7**	**328.8**	**303.7**	**292.7**	**302.6**	**287.8**

Sources: DP World (2016) and Patrick (2016).

Table 3.4 Timeslots available and actually used by trucks: Adelaide

			2013		2014				2015			
	Weekday	Shift	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr
Available timeslots	Monday – Friday	Day	26.9	23.9	25.9	24.4	26.2	24.8	25.0	24.7	26.6	25.6
('000)		Evening	20.1	18.0	18.7	18.4	18.4	17.5	17.6	17.4	18.2	18.7
		Night									15.6	17.2
		Sub-total	**47.0**	**41.9**	**44.5**	**42.8**	**44.6**	**42.3**	**42.6**	**42.1**	**60.4**	**61.4**
	Saturday	Day										
		Evening										
		Night										
		Sub-total										
	Sunday	Day										
		Evening										
		Night										
		Sub-total										
	Total available timeslots		**47.0**	**41.9**	**44.5**	**42.8**	**44.6**	**42.3**	**42.6**	**42.1**	**60.4**	**61.4**
Used timeslots	Monday – Friday	Day	26.3	24.0	25.6	24.2	25.5	25.1	24.7	24.2	26.3	25.5
('000)		Evening	19.5	17.9	18.4	18.2	17.3	17.3	17.3	16.7	17.4	18.4
		Night									11.2	15.4
		Sub-total	**45.8**	**41.9**	**44.0**	**42.4**	**42.8**	**42.4**	**42.0**	**40.9**	**54.9**	**59.3**
	Saturday	Day										
		Evening										
		Night										
		Sub-total										
	Sunday	Day										
		Evening										
		Night										
		Sub-total										
	Total used timeslots		**45.8**	**41.9**	**44.0**	**42.4**	**42.8**	**42.4**	**42.0**	**40.9**	**54.9**	**59.3**

Note: Blank cells mean no data was reported for the categories. Until September Quarter 2015, Adelaide did not operate VBS on night shift.

Source: Flinders Adelaide Container Terminal (2016).

Table 3.5 Timeslots available and actually used by trucks: Fremantle

			2013		2014				2015			
	Weekday	Shift	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr
Available timeslots	Monday – Friday	Day	64.8	69.3	70.9	75.1	80.5	82.5	78.3	73.9	76.1	74.4
('000)		Evening	21.0	21.1	20.9	19.3	22.0	24.9	21.5	21.5	24.9	25.3
		Night	6.0	6.4	8.5	10.4	12.2	13.4	9.0	7.2	9.3	11.1
		Sub-total	**91.8**	**96.9**	**100.3**	**104.8**	**114.7**	**120.8**	**108.8**	**102.6**	**110.3**	**110.8**
	Saturday	Day	4.4	5.5	6.7	7.0	7.3	7.6	5.6	6.0	4.5	4.5
		Evening	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Night	1.3	1.9	1.8	0.0	0.3	0.0	0.0	0.1	0.2	0.1
		Sub-total	**5.7**	**7.4**	**8.5**	**7.0**	**7.6**	**7.7**	**5.6**	**6.1**	**4.8**	**4.6**
	Sunday	Day	10.4	11.0	5.7	4.2	6.7	7.1	6.3	6.7	4.9	7.0
		Evening	1.2	1.4	0.3	0.3	0.3	0.4	0.3	0.4	0.4	0.4
		Night	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.1	0.1
		Sub-total	**11.6**	**12.5**	**6.0**	**4.5**	**7.0**	**7.6**	**6.6**	**7.4**	**5.3**	**7.5**
	Total available timeslots		**109.0**	**116.7**	**114.8**	**116.2**	**129.3**	**136.1**	**121.0**	**116.0**	**120.5**	**122.9**
Used timeslots	Monday – Friday	Day	60.9	65.7	68.6	72.2	79.0	80.0	76.5	72.4	75.0	73.1
('000)		Evening	19.4	20.0	20.1	18.2	21.6	23.8	20.4	20.2	24.0	24.5
		Night	5.6	6.1	8.0	9.7	11.9	13.1	8.6	7.1	9.1	10.9
		Sub-total	**85.9**	**91.9**	**96.7**	**100.1**	**112.5**	**116.9**	**105.5**	**99.7**	**108.1**	**108.6**
	Saturday	Day	3.9	4.8	6.2	6.6	7.2	7.3	5.4	5.9	4.3	4.4
		Evening	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Night	1.2	1.9	1.8	0.0	0.2	0.0	0.0	0.1	0.2	0.1
		Sub-total	**5.1**	**6.7**	**8.0**	**6.6**	**7.4**	**7.3**	**5.5**	**6.0**	**4.6**	**4.5**
	Sunday	Day	9.7	10.2	5.4	3.9	6.6	6.7	5.9	6.3	4.7	6.8
		Evening	1.1	1.4	0.2	0.2	0.3	0.4	0.3	0.4	0.4	0.4
		Night	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.1	0.1
		Sub-total	**10.9**	**11.6**	**5.6**	**4.2**	**6.9**	**7.2**	**6.2**	**6.9**	**5.1**	**7.3**
	Total used timeslots		**101.9**	**110.2**	**110.3**	**110.9**	**126.8**	**131.4**	**117.2**	**112.6**	**117.8**	**120.4**

Note: Data are rounded to the nearest 1000. Cells with an entry of "0.0" mean that data were reported but rounded to zero.

Sources: DP World (2016) and Patrick (2016).

Table 3.6 Timeslots available and actually used by trucks: Five ports

			2013		2014				2015			
	Weekday	Shift	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr
Available timeslots	Monday – Friday	Day	431.1	437.5	436.2	459.8	467.0	447.0	424.0	437.7	462.4	442.9
('000)		Evening	188.8	186.7	184.0	197.3	199.9	197.9	187.4	190.5	194.2	188.2
		Night	122.4	123.4	118.6	127.4	131.9	143.4	125.5	124.5	145.9	151.7
		Sub-total	**742.3**	**747.6**	**738.8**	**784.6**	**798.8**	**788.3**	**736.9**	**752.7**	**802.5**	**782.8**
	Saturday	Day	44.1	52.1	53.5	56.8	54.4	58.6	50.5	56.8	52.8	53.5
		Evening	8.4	9.6	5.0	5.0	5.0	6.9	5.3	6.6	4.9	2.4
		Night	18.7	20.8	9.7	8.8	9.0	12.5	11.5	12.3	12.1	11.8
		Sub-total	**71.3**	**82.5**	**68.2**	**70.6**	**68.4**	**78.1**	**67.3**	**75.7**	**69.8**	**67.7**
	Sunday	Day	47.6	46.9	33.6	31.1	29.1	35.0	24.9	33.8	27.3	30.2
		Evening	18.6	17.8	13.6	13.5	14.8	16.0	14.4	14.4	15.1	14.1
		Night	13.1	13.9	11.6	10.0	11.1	13.1	9.3	10.2	11.7	9.1
		Sub-total	**79.2**	**78.6**	**58.8**	**54.6**	**54.9**	**64.1**	**48.6**	**58.5**	**54.1**	**53.4**
	Total available timeslots		**892.8**	**908.6**	**865.7**	**909.8**	**922.1**	**930.5**	**852.7**	**886.9**	**926.4**	**903.9**
Used timeslots	Monday – Friday	Day	411.3	411.7	406.1	421.9	448.6	426.5	402.3	410.8	427.3	405.2
('000)		Evening	179.7	178.4	174.8	179.9	191.1	186.5	175.0	177.5	180.6	176.7
		Night	112.5	114.1	105.7	111.3	124.3	136.1	115.9	115.2	134.4	142.1
		Sub-total	**703.5**	**704.2**	**686.6**	**713.1**	**764.0**	**749.0**	**693.2**	**703.5**	**742.3**	**724.0**
	Saturday	Day	41.1	48.1	47.1	50.0	50.7	54.2	45.8	50.9	46.3	44.8
		Evening	7.4	9.2	4.2	3.1	3.9	4.8	4.1	5.0	2.9	2.0
		Night	16.3	18.1	8.9	7.9	8.7	12.3	10.7	11.7	11.7	11.5
		Sub-total	**64.8**	**75.4**	**60.3**	**61.0**	**63.3**	**71.3**	**60.5**	**67.6**	**61.0**	**58.3**
	Sunday	Day	43.9	44.2	29.3	24.5	27.1	31.6	21.9	30.3	24.5	28.8
		Evening	17.5	16.7	12.9	12.2	14.4	15.3	13.3	13.1	14.1	13.3
		Night	12.0	12.7	10.1	8.4	10.1	12.6	8.1	8.7	10.0	8.0
		Sub-total	**73.4**	**73.6**	**52.3**	**45.1**	**51.5**	**59.5**	**43.3**	**52.1**	**48.6**	**50.0**
	Total used timeslots		**841.7**	**853.1**	**799.3**	**819.2**	**878.8**	**879.8**	**797.0**	**823.2**	**851.8**	**832.4**

Sources: DP World (2016), Flinders Adelaide Container Terminal (2016), Hutchison Ports Australia (2016) and Patrick (2016).

CHAPTER 4
Port interface cost index

Overview

The port interface cost index (PICI) provides a measure of shore-based shipping charges which approximate costs of carting containers through Australia's mainland major city ports. The PICI is based on an indicative approach; that is, the index is not an average of all charges, but is based on those typically charged by service providers in most instances. The PICI is computed as a national average (Table 4.6) taking into account the port fees and charges for imports and exports of containers at the five major container ports (Table 4.1 to 4.5).

What PICI measures

The PICI is a measure of shore-based shipping costs or charges for containers moved through mainland capital city ports. These are called "shore-based" because they are that part of the charges paid by importers and exporters of containers which are directly related to the activity which occurs in the port and on the wharf. They do not include the total price for importing or exporting goods carried in containers paid by customers to customs brokers and freight forwarders. The index is a measure of the movements in costs to users of waterfront and related services and signals whether the cost is increasing or decreasing. The waterfront is defined as the interface between seaports and land transport, hence the term port interface cost index. Port interface costs are estimated for standard representative ships.

The port interface cost index is based on twenty indicators which fall in four main groups:

a. Parameters used in computing the index;
b. Ship-based charges;
c. Cargo-based charges; and
d. Other charges, namely: Stevedoring costs; Customs brokers' fees; Road transport costs.

Parameters used in computing the index

These parameters enable the PICI charges to be estimated on a per TEU basis for these typical ships.

Indicator 4.1 Ship size

The port interface costs vary by ship size.

Ship size is the total internal capacity of a ship often referred to as Gross (Registered) Tonnage. The PICI has as its starting point the estimation of parameters for three typical sizes of container ships:

- 9 991 GT ship represents all ships of sizes ranging from 5 000 to 20 000 GT
- 37 394 GT ship represents all ships of sizes ranging from 35 000 to 40 000 GT
- 53 324 GT ship represents all ships of sizes ranging from 50 000 to 55 000 GT

Indicator 4.2 Average TEUs exchanged

This is the sum of Indicator 4.3 and Indicator 4.6.

Indicator 4.3 Average TEUs Full (or loaded)

This is the sum of Indicator 4.4 and Indicator 4.5.

Indicator 4.4 Average TEUs Full inwards (or imports)

This is the sum of full (or loaded) import containers converted to standardised twenty foot equivalent units moved into a port by ships in a GT range, divided by the number of ship visits in the GT range for the given period.

Indicator 4.5 TEUs Full outwards (or exports)

This is the sum of full (or loaded) export containers converted to standardised twenty foot equivalent units moved out of a port by ships in a GT range, divided by the number of ship visits in the GT range for the given period.

Indicator 4.6 Empty TEUs

This is the sum of empty import and empty export containers converted to standardised twenty foot equivalent units that are moved into and out of a port by ships in a GT range, divided by the number of ship visits in the GT range for the given period.

Indicator 4.7 Average number of port calls by ships in the GT range

This is the total number of ship calls to a container port by ships in the GT range, divided by the number of ship visits in the GT range for the given period.

Indicator 4.8 Average elapsed berth time for ships in GT range

This is the total number of elapsed berth time in hours for ships in the GT range, divided by the number of ship visits in the GT range for the given period. A ship's elapsed berth time (hours) is the time between a ship's arrival at berth, and a ship's departure from berth.

These parameters are summarised at the table of each of Tables 4.1 to 4.5 for each container port.

Ship-based charges ($ per ship visit)

Indicator 4.9 Total ship-based charges by ship visit

Ship-based charges are the charges ship owners pay for a port visit by the ship.

Indicator 4.10 Total ship-based charges for handling empty containers

This is also a summary cost indicator for the port. It is computed as the sum of wharfage, harbour dues, berth charges and channel fees charged per empty TEU multiplied by the average number of empty TEUs exchanged.

Ship-based charges ($ per TEU)

Indicator 4.11 Conservancy

Conservancy charges are navigation service charges levied by the government of the state in which the port is situated.

Indicator 4.12 Tonnage

Tonnage charges are based on the Gross Tonnage of the ship—port service charges levied by the port authority.

Indicator 4.13 Pilotage

Pilotage charges cover services for piloting the ship. A pilot is a mariner who guides ships through dangerous or congested waters, such as harbors or river mouths. Pilots are expert ship handlers who possess detailed knowledge of local waterways.

Indicator 4.14 Towage

Towage charges are levied by the operator of a tugboat—a boat that manoeuvres vessels by pushing or towing them.

Indicator 4.15 Mooring, unmooring charges

These relate to the services provided to moor—make fast (a ship, for example) by means of cables, anchors, or lines or to unmoor—to loosen (a ship) from moorings or anchorage. These charges can be levied either by the port authority, stevedoring company or other service providers

Indicator 4.16 Total ship-based charges per TEU

The total costs are the sum of the ship-based charges in Indicators 4.11 to 4.15.

Cargo-based fees and charges ($ per TEU)

Each of these fees and charges are discussed only once in the text below. They are however, listed separately for imports and exports in Tables 4.1 to 4.5.

Indicator 4.17 Cargo based: Wharfage

Wharfage is the charge assessed against cargo or merchandise, vessel's stores, fuel and supplies for passage on, over, under or through any wharf, pier, or bank controlled by a port authority. Wharfage is also charged for cargo passing between ships or overside ships (to or from barge, lighter or water) when berthed at a wharf, pier or bank controlled by the port authority.

Indicator 4.18 Cargo based: Harbour dues

These are monies that a ship owner must pay to a port authority for keeping a ship in a harbour. The amount of money charged is usually based on the volume of cargo the ship is carrying.

Other cargo-based charges ($ per TEU)

Indicator 4.19 Other charges: Stevedoring charge

Stevedoring charges are the charges levied by stevedoring companies for handling containers. They are estimated for Australia each year by the Australian Competition and Consumer Commission (ACCC) which monitors their price. The stevedoring costs are taken from the ACCC's annual report on the stevedoring industry.

Indicator 4.20 Other charges: Customs broker fees

These are the fees charged by customs brokers for the administrative costs associated with organising the import and export of containers for a representative consignment.

Indicator 4.21 Other charges: Road transport charges

Transport charges are estimates of what transport companies charge for transporting a container to or from the wharf from/to the metropolitan area of the capital city in which the port is situated. These charges are estimated for a representative transport distance.

Indicator 4.22 Total fees and charges ($/TEU)

This is the sum of ship-based charges per TEU, the cargo-based charges per TEU, and the other cargo-based charges per TEU. These costs enable the calculation of the national PICI measured in current and constant prices in dollars per TEU. These are computed separately for imports and exports in Tables 4.2 to 4.6.

Indicator 4.23 Port's share in national index

These shares are used in computing the national PICI and they are computed for exports and imports separately as follows.

For each port compute the port shares for imports:

1. Compute PICI (port k, imports) is given by the average (total) port interface cost for imports (Indicator 4.22) times the total TEUs imported through the port (Indicator 4.4);
2. Compute PICI (5 ports, imports) is the sum PICI (Brisbane, imports), PICI (Sydney, imports), PICI (Melbourne, imports), PICI (Adelaide, imports), PICI (Fremantle, imports);
3. Then share (port k, imports) = PICI (port k, imports) / PICI (5 ports, imports).

Similarly for each port compute the port shares for exports:

1. Compute PICI (port k, exports) is given by the average (total) port interface cost for exports (Indicator 4.22) times the total TEUs imported through the port (Indicator 4.5);
2. Compute PICI (5 ports, exports) is the sum PICI (Brisbane, exports), PICI (Sydney, exports), PICI (Melbourne, exports), PICI (Adelaide, exports), PICI (Fremantle, exports);
3. Then share (port k, exports) = PICI (port k, exports)/ PICI (5 ports, exports).

Indicator 4.24 National Port Interface Cost index for ships in GT range

The national port interface cost indexes are the main outputs of the PICI calculations. These indexes are computed separately for imports and exports and for each of the ship GT ranges monitored in Waterline:

- 5 000 to 20 000 GT
- 35 000 to 40 000 GT
- 50 000 to 55 000 GT

The national PICI for ships in a GT range is the national average cost per TEU. From BTCE (1993) this is a weighted average of individual port estimates computed as follows, taking imports shipped in ships in the 5 000 to 20 000 GT as an example.

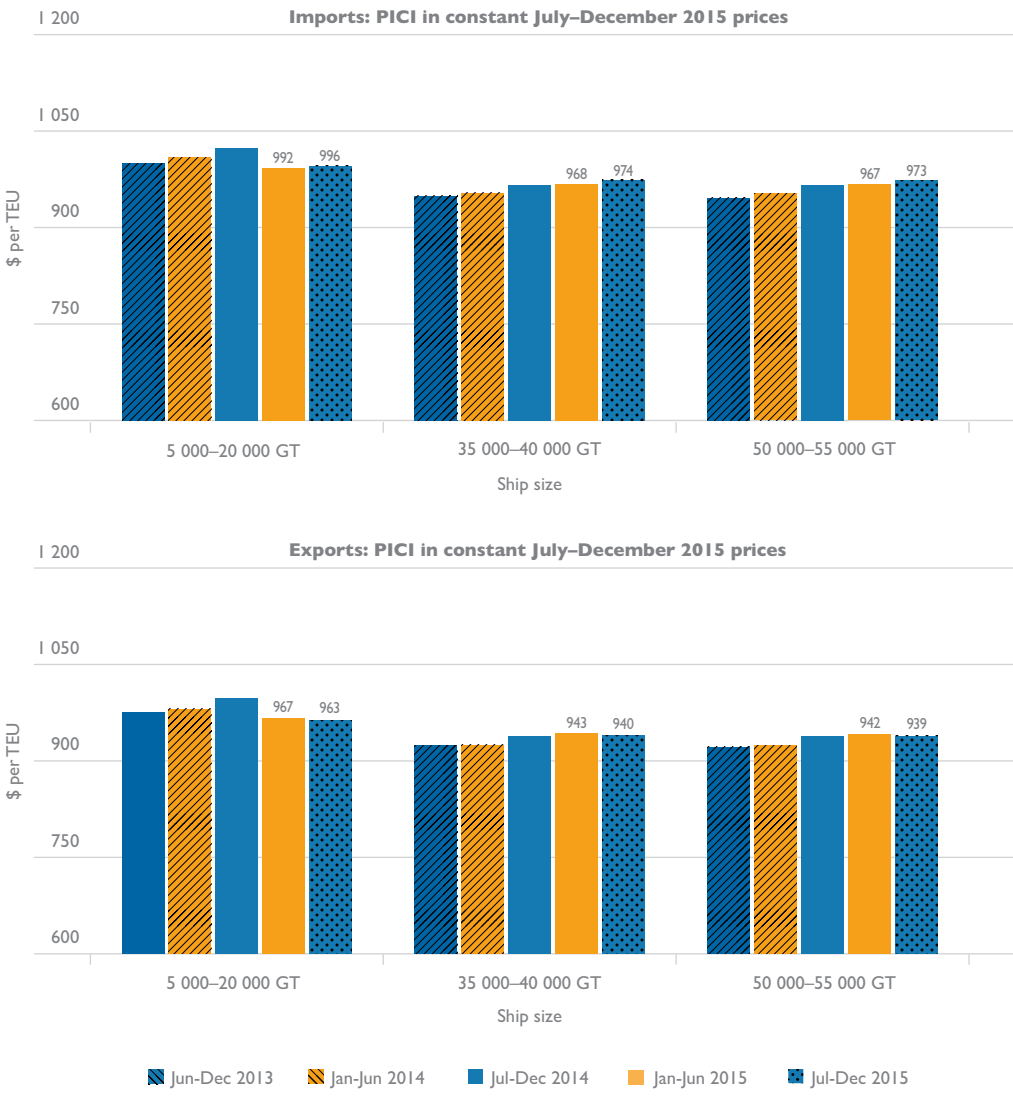
Now let $TC_{Br,M}$, $TC_{Sy,M}$, $TC_{Mel,M}$, $TC_{Ad,M}$, $TC_{Fr,M}$, respectively stand for the sum of ship-based, cargo-based and other fees and charges on each TEU of imports transported to a Brisbane port (Br), Sydney port (Sy), Melbourne port (Mel), Adelaide (Ad) and Frematle (Fr) for ships in the 5 000 to 20 000 GT range.

Then PICI for imports shipped in ships in the 5 000 to 20 000 GT

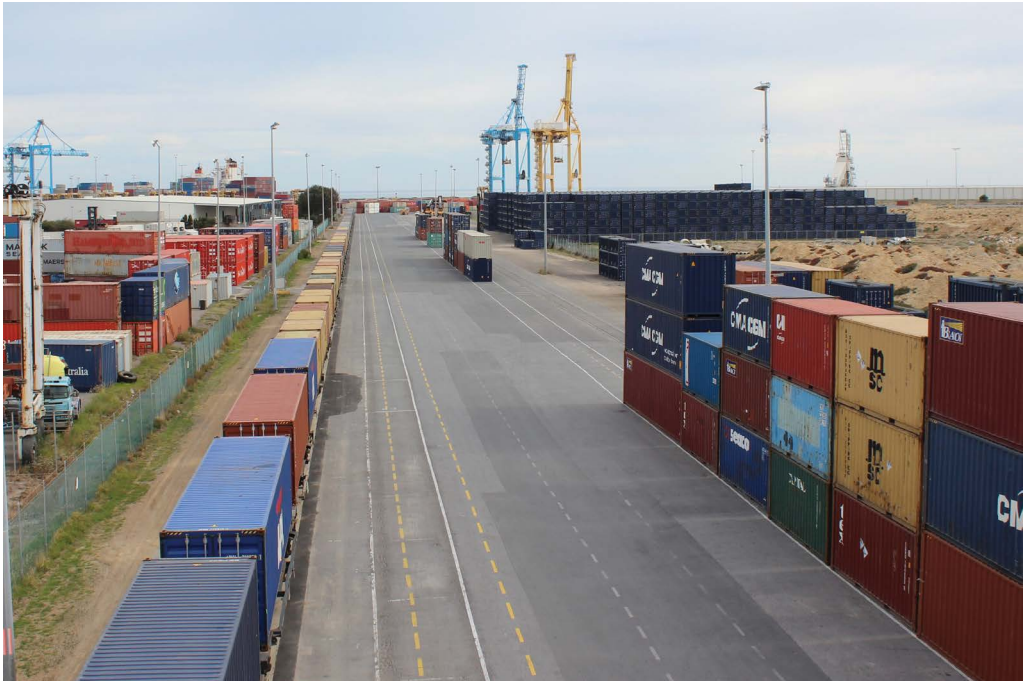
$$= b_{1*}TC_{Br,M} + b_{2*}TC_{Sy,M} + b_{3*}TC_{Mel,M} + b_{4*}TC_{Ad,M} + b_{5*}TC_{Fr,M}$$

The shares b_1, b_2, b_3, b_4, b_5 are as computed in Indicator 4.23. Note that these shares are different for imports and exports.

Figure 4.1 Port Interface Cost Index for container imports and exports, by ship size



Sources: BITRE estimates based on data in Tables 4.1 to 4.5 and data from ABS (2016).



Rail siding, rail intermediate stacks and retainer stacks at Flinders Adelaide Container Terminal. Photo courtesy of Flinders Adelaide Container Terminal.

Table 4.1 Port interface costs by ship type – parameters and estimates: Brisbane

	5 000 to 20 000 GT ships					35 000 to 40 000 GT ships					50 000 to 55 000 GT ships				
	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015
Parameters used in estimation of the port interface fees and charges [a]															
Total TEUs exchanged	310	258	286	289	267	1 187	1 127	1 273	1 138	1 391	1 396	1 232	1 489	1 330	1 449
Loaded	241	222	223	223	208	934	839	957	849	1 001	1 031	858	1 034	917	974
Loaded inwards	154	137	104	97	80	602	552	620	539	665	582	507	617	548	593
Loaded outwards	86	85	119	126	128	332	287	336	310	336	449	350	417	370	382
Empty	69	37	63	66	60	253	287	316	289	390	365	374	455	413	475
No of port calls by ships in GT range	5	5	4	5	4	3	3	4	3	4	3	4	4	3	4
Elapsed berth time for ships in GT range *(hours)*	17	16	19	19	27	23	26	27	25	29	21	22	24	22	21
Charges per ship visit *($)*															
Total ship-based charges	22 161	23 126	23 851	24 092	23 617	41 599	43 106	44 374	44 822	44 480	49 178	50 913	52 402	52 919	52 610
Empty TEUs [b]	1 315	698	1 234	1 289	1 333	4 833	5 482	6 208	5 662	8 727	6 968	7 134	8 935	8 097	10 615
Ship-based charges ($/TEU)															
Conservancy	6	8	7	7	8	6	7	6	7	6	7	9	7	8	8
Tonnage	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pilotage	26	32	30	30	32	13	14	13	14	12	13	15	13	14	13
Towage	31	39	36	36	40	14	15	14	16	13	13	15	13	15	14
Mooring, unmooring [c]	8	11	11	11	9	2	3	2	3	2	2	2	2	2	2
Total ship-based charges *($/TEU)*	72	90	83	83	88	35	38	35	39	32	35	41	35	40	36
Fees and charges for imports *($/TEU)*															
Ship-based charges	72	90	83	83	88	35	38	35	39	32	35	41	35	40	36
Cargo-based charges															
Wharfage	33	33	34	36	36	33	33	34	36	36	33	33	34	36	36
Harbour dues	63	63	56	66	66	63	63	56	66	66	63	63	56	66	66
Other charges															
Stevedoring	177	176	176	172	172	177	176	176	172	172	177	176	176	172	172
Customs brokers' fees	142	149	150	150	150	142	149	150	150	150	142	149	150	150	150
Road transport charges	452	456	459	466	470	452	456	459	466	470	452	456	459	466	470
Total fees and charges *($/TEU)*	**939**	**967**	**959**	**974**	**982**	**902**	**916**	**910**	**930**	**926**	**902**	**919**	**911**	**930**	**930**
Port's share in national index [d]	**18%**	**16%**	**16%**	**17%**	**17%**	**17%**	**15%**	**15%**	**16%**	**16%**	**17%**	**15%**	**15%**	**16%**	**16%**

	5 000 to 20 000 GT ships					35 000 to 40 000 GT ships					50 000 to 55 000 GT ships				
	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015
Fees and charges for exports *($/TEU)*															
Ship-based charges	72	90	83	83	88	35	38	35	39	32	35	41	35	40	36
Cargo-based charges															
Wharfage	33	33	34	36	36	33	33	34	36	36	33	33	34	36	36
Harbour dues	63	63	56	66	66	63	63	56	66	66	63	63	56	66	66
Other charges															
Stevedoring	177	176	176	172	172	177	176	176	172	172	177	176	176	172	172
Customs brokers' fees	157	164	164	164	156	157	164	164	164	156	157	164	164	164	156
Road transport charges	452	456	459	466	470	452	456	459	466	470	452	456	459	466	470
Total fees and charges *($/TEU)*	**954**	**982**	**973**	**989**	**989**	**917**	**931**	**925**	**944**	**932**	**917**	**934**	**925**	**945**	**937**
Port's share in national index[e]	**18%**	**16%**	**16%**	**17%**	**17%**	**17%**	**15%**	**15%**	**16%**	**16%**	**17%**	**15%**	**15%**	**16%**	**16%**

Notes: Estimates of charges and fees are rounded to the nearest whole dollar. A value of zero indicates that the charge or fees per TEU is less than fifty cents.

a The average TEUs exchanged and the ship call parameters are mean values for ships in the GT category for the period in question.

b Sum of wharfage, harbour dues, berth charges and channel fees charged per empty TEU multiplied by the average number of empty TEUs exchanged.

c BITRE estimates.

d This is estimated as the TEU imports brought to the port as a per cent of five ports TEU imports.

e This is estimated as the TEU exports brought to the port as a per cent of five ports TEU exports.

Sources: BITRE estimates based on ship call data from port authorities and other sources as described in text.

Table 4.2 Port interface costs by ship type – parameters and estimates: Sydney

	5 000 to 20 000 GT ships					35 000 to 40 000 GT ships					50 000 to 55 000 GT ships				
	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015
Parameters used in estimation of the port interface fees and charges [a]															
Total TEUs exchanged	179	196	203	498	620	1 824	1 861	2 071	2 158	2 163	2 323	1 998	2 220	2 427	2 530
Loaded	141	153	154	448	582	1 191	1 195	1 360	1 477	1 451	1 606	1 303	1 512	1 693	1 725
Loaded inwards	71	69	54	185	274	846	867	963	989	1 009	1 179	928	1 083	1 135	1 180
Loaded outwards	70	84	100	263	308	345	328	397	488	442	427	376	429	558	545
Empty	37	42	49	50	38	633	666	711	681	712	717	695	709	733	805
No of port calls by ships in GT range	4	4	4	6	5	3	3	3	2	3	3	3	4	3	3
Elapsed berth time for ships in GT range *(hours)*	18	17	25	27	28	35	28	33	35	32	36	29	37	40	38
Charges per ship visit *($)*															
Total ship-based charges	20 078	20 260	21 261	23 351	23 550	42 663	42 884	44 595	49 453	49 453	51 649	51 863	55 433	60 663	60 946
Empty TEUs [b]	484	547	649	660	512	8 178	8 613	9 438	9 038	9 668	9 271	8 982	9 404	9 731	10 929
Ship-based charges ($/TEU)															
Conservancy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tonnage	28	26	27	11	9	10	10	10	10	10	12	13	13	12	12
Pilotage	9	9	9	7	6	3	3	2	4	4	2	2	2	4	4
Towage	60	56	56	23	19	8	8	7	7	7	7	8	7	7	7
Mooring, unmooring [c]	15	13	13	5	4	2	2	2	2	2	2	2	2	2	2
Total ship-based charges *($/TEU)*	112	104	105	47	38	23	23	22	23	23	22	26	25	25	24
Fees and charges for imports *($/TEU)*															
Ship-based charges	112	104	105	47	38	23	23	22	23	23	22	26	25	25	24
Cargo-based charges															
Wharfage	117	117	125	125	127	117	117	125	125	127	117	117	125	125	127
Harbour dues	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other charges															
Stevedoring	177	176	176	172	172	177	176	176	172	172	177	176	176	172	172
Customs brokers' fees	148	153	153	153	153	148	153	153	153	153	148	153	153	153	153
Road transport charges	525	525	529	517	517	525	525	529	517	517	525	525	529	517	517
Total fees and charges *($/TEU)*	**1 079**	**1 075**	**1 088**	**1 013**	**1 007**	**990**	**995**	**1 005**	**989**	**992**	**989**	**998**	**1 008**	**991**	**993**
Port's share in national index [d]	**31%**	**34%**	**34%**	**34%**	**34%**	**29%**	**32%**	**32%**	**32%**	**32%**	**29%**	**32%**	**32%**	**32%**	**32%**

	5 000 to 20 000 GT ships					35 000 to 40 000 GT ships					50 000 to 55 000 GT ships				
	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015
Fees and charges for exports *($/TEU)*															
Ship-based charges	112	104	105	47	38	23	23	22	23	23	22	26	25	25	24
Cargo-based charges															
Wharfage	72	72	79	79	82	72	72	79	79	82	72	72	79	79	82
Harbour dues	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other charges															
Stevedoring	177	176	176	172	172	177	176	176	172	172	177	176	176	172	172
Customs brokers' fees	138	137	144	144	137	138	137	144	144	137	138	137	144	144	137
Road transport charges	525	525	529	517	517	525	525	529	517	517	525	525	529	517	517
Total fees and charges *($/TEU)*	**1 025**	**1 013**	**1 033**	**959**	**945**	**936**	**933**	**950**	**935**	**930**	**934**	**936**	**953**	**937**	**931**
Port's share in national index[e]	**31%**	**34%**	**34%**	**34%**	**34%**	**29%**	**32%**	**32%**	**32%**	**32%**	**29%**	**32%**	**32%**	**32%**	**32%**

Notes: Estimates of charges and fees are rounded to the nearest whole dollar. A value of zero indicates that the charge or fees per TEU is less than fifty cents.

a The average TEUs exchanged and the ship call parameters are mean values for ships in the GT category for the period in question.

b Sum of wharfage, harbour dues, berth charges and channel fees charged per empty TEU multiplied by the average number of empty TEUs exchanged.

c BITRE estimates.

d This is estimated as the TEU imports brought to the port as a per cent of five ports TEU imports.

e This is estimated as the TEU exports brought to the port as a per cent of five ports TEU exports.

Sources: BITRE estimates based on ship call data from port authorities and other sources as described in text.

Table 4.3 Port interface costs by ship type – parameters and estimates: Melbourne

	5 000 to 20 000 GT ships					35 000 to 40 000 GT ships					50 000 to 55 000 GT ships				
	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015
Parameters used in estimation of the port interface fees and charges [a]															
Total TEUs exchanged	442	400	407	700	774	1 904	2 032	2 286	2 151	2 158	2 577	2 456	2 623	2 575	2 841
Loaded	335	294	289	585	705	1 597	1 701	1 877	1 752	1 730	2 078	1 979	2 059	2 039	2 221
Loaded inwards	151	103	53	218	332	1 004	1 014	1 198	1 095	1 142	1 202	1 094	1 246	1 190	1 396
Loaded outwards	185	191	236	367	372	593	687	679	657	588	876	885	812	850	825
Empty	106	106	118	116	69	307	331	410	400	428	499	477	565	535	620
No of port calls by ships in GT range	3	3	3	5	6	3	3	3	3	3	3	3	4	3	3
Elapsed berth time for ships in GT range *(hours)*	29	26	23	25	22	28	28	31	27	31	29	29	31	30	31
Charges per ship visit *($)*															
Total ship-based charges	25 162	25 438	26 810	27 115	27 475	49 680	50 053	53 903	54 176	55 298	60 371	60 758	65 883	66 121	67 581
Empty TEUs [b]	1 867	1 869	2 088	2 047	1 261	5 398	5 831	7 256	7 080	7 787	8 786	8 386	9 999	9 477	11 271
Ship-based charges ($/TEU)															
Conservancy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tonnage	13	14	16	9	9	11	10	11	11	11	12	12	13	13	12
Pilotage	17	19	19	11	10	7	6	6	6	6	5	6	5	6	5
Towage	25	29	29	17	16	8	8	7	7	8	6	6	6	6	6
Mooring, unmooring [c]	2	2	2	1	1	1	0	0	0	0	0	0	0	0	0
Total ship-based charges *($/TEU)*	57	64	66	39	36	26	25	24	25	26	23	25	25	26	24
Fees and charges for imports *($/TEU)*															
Ship-based charges	57	64	66	39	36	26	25	24	25	26	23	25	25	26	24
Cargo-based charges															
Wharfage	71	71	71	71	73	71	71	71	71	73	71	71	71	71	73
Harbour dues	39	39	40	40	41	39	39	40	40	41	39	39	40	40	41
Other charges															
Stevedoring	177	176	176	172	172	177	176	176	172	172	177	176	176	172	172
Customs brokers' fees	153	153	153	155	155	153	153	153	155	155	153	153	153	155	155
Road transport charges	531	534	536	536	539	531	534	536	536	539	531	534	536	536	539
Total fees and charges *($/TEU)*	**1 027**	**1 036**	**1 043**	**1 013**	**1 016**	**996**	**997**	**1 000**	**999**	**1 006**	**994**	**997**	**1 002**	**1 000**	**1 004**
Port's share in national index [d]	**40%**	**39%**	**39%**	**39%**	**38%**	**38%**	**37%**	**37%**	**36%**	**36%**	**38%**	**37%**	**37%**	**36%**	**36%**

	5 000 to 20 000 GT ships					35 000 to 40 000 GT ships					50 000 to 55 000 GT ships				
	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015
Fees and charges for exports *($/TEU)*															
Ship-based charges	57	64	66	39	36	26	25	24	25	26	23	25	25	26	24
Cargo-based charges															
Wharfage	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
Harbour dues	39	39	40	40	41	39	39	40	40	41	39	39	40	40	41
Other charges															
Stevedoring	177	176	176	172	172	177	176	176	172	172	177	176	176	172	172
Customs brokers' fees	142	143	144	150	141	142	143	144	150	141	142	143	144	150	141
Road transport charges	531	534	536	536	539	531	534	536	536	539	531	534	536	536	539
Total fees and charges *($/TEU)*	**1 017**	**1 026**	**1 033**	**1 008**	**1 000**	**986**	**988**	**991**	**994**	**990**	**983**	**988**	**993**	**995**	**988**
Port's share in national index[e]	**40%**	**39%**	**39%**	**39%**	**39%**	**38%**	**37%**	**37%**	**37%**	**36%**	**38%**	**37%**	**37%**	**37%**	**36%**

Notes: Estimates of charges and fees are rounded to the nearest whole dollar. A value of zero indicates that the charge or fees per TEU is less than fifty cents.

a The average TEUs exchanged and the ship call parameters are mean values for ships in the GT category for the period in question.

b Sum of wharfage, harbour dues, berth charges and channel fees charged per empty TEU multiplied by the average number of empty TEUs exchanged.

c BITRE estimates.

d This is estimated as the TEU imports brought to the port as a per cent of five ports TEU imports.

e This is estimated as the TEU exports brought to the port as a per cent of five ports TEU exports.

Sources: BITRE estimates based on ship call data from port authorities and other sources as described in text.

Table 4.4 Port interface costs by ship type – parameters and estimates: Adelaide

	5 000 to 20 000 GT ships					35 000 to 40 000 GT ships					50 000 to 55 000 GT ships				
	Jan-Jun 2013	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015
Parameters used in estimation of the port interface fees and charges [a]															
Total TEUs exchanged						903	981	1 023	1 041	968	1 337	1 363	1 109	1 065	1 060
Loaded						673	750	757	786	681	1 069	1 104	903	872	814
Loaded inwards						293	306	329	336	237	525	490	425	414	422
Loaded outwards						380	444	427	450	444	544	614	478	458	391
Empty						230	231	266	255	287	268	259	206	194	246
No of port calls by ships in GT range						2	2	2	2	2	3	2	2	2	2
Elapsed berth time for ships in GT range *(hours)*						22	23	21	23	20	29	28	23	22	21
Charges per ship visit ($)															
Total ship-based charges						40 189	40 496	41 940	42 828	43 015	48 463	48 410	48 556	48 823	49 418
Empty TEUs [b]						1 519	1 521	1 815	1 736	1 992	1 769	1 712	1 405	1 320	1 705
Ship-based charges ($/TEU)															
Conservancy						5	5	5	5	5	5	5	6	6	7
Tonnage						10	10	9	9	10	10	10	11	11	11
Pilotage						7	6	6	6	7	4	4	6	6	6
Towage						22	21	21	21	23	17	16	21	22	23
Mooring, unmooring [c]						-	-	-	-	-	-	-	-	-	-
Total ship-based charges *($/TEU)*						45	41	41	41	44	36	36	44	46	47
Fees and charges for imports *($/TEU)*															
Ship-based charges						45	41	41	41	44	36	36	44	46	47
Cargo-based charges															
Wharfage						82	82	84	84	85	82	82	84	84	85
Harbour dues						7	7	7	7	7	7	7	7	7	7
Other charges															
Stevedoring						177	176	176	172	172	177	176	176	172	172
Customs brokers' fees						148	148	149	149	149	148	148	148	148	148
Road transport charges						350	354	358	377	381	350	354	358	377	381
Total fees and charges *($/TEU)*						**808**	**808**	**814**	**829**	**838**	**800**	**802**	**817**	**833**	**839**
Port's share in national index [d]						**6%**	**6%**	**6%**	**5%**	**5%**	**6%**	**6%**	**6%**	**5%**	**5%**

	5 000 to 20 000 GT ships					35 000 to 40 000 GT ships					50 000 to 55 000 GT ships				
	Jan-Jun 2013	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015
Fees and charges for exports *($/TEU)*															
Ship-based charges						45	41	41	41	44	36	36	44	46	47
Cargo-based charges															
Wharfage						82	82	84	84	85	82	82	84	84	85
Harbour dues						7	7	7	7	7	7	7	7	7	7
Other charges															
Stevedoring						177	176	176	172	172	177	176	176	172	172
Customs brokers' fees						111	112	112	112	103	111	112	112	112	103
Road transport charges						350	354	358	377	381	350	354	358	377	381
Total fees and charges *($/TEU)*						**771**	**771**	**777**	**792**	**792**	**763**	**766**	**780**	**797**	**795**
Port's share in national index[e]						**6%**	**6%**	**6%**	**5%**	**5%**	**6%**	**6%**	**6%**	**5%**	**5%**

Notes: Estimates of charges and fees are rounded to the nearest whole dollar. A value of zero indicates that the charge or fees per TEU is less than fifty cents.
Blank cells mean the data are not reported.

a The average TEUs exchanged and the ship call parameters are mean values for ships in the GT category for the period in question.

b Sum of wharfage, harbour dues, berth charges and channel fees charged per empty TEU multiplied by the average number of empty TEUs exchanged.

c BITRE estimates.

d This is estimated as the TEU imports brought to the port as a per cent of five ports TEU imports.

e This is estimated as the TEU exports brought to the port as a per cent of five ports TEU exports.

Sources: BITRE estimates based on ship call data from port authorities and other sources as described in text.

Table 4.5 Port interface costs by ship type – parameters and estimates: Fremantle

	5 000 to 20 000 GT ships					35 000 to 40 000 GT ships					50 000 to 55 000 GT ships				
	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015
Parameters used in estimation of the port interface fees and charges [a]															
Total TEUs exchanged	2 709	2 532	2 831	2 499	2 587	854	793	786	748	780	1 519	1 451	1 620	1 483	1 503
Loaded	2 112	2 120	2 251	1 999	2 029	664	637	641	610	621	1 152	1 129	1 225	1 130	1 110
Loaded inwards	1 303	1 218	1 359	1 197	1 264	453	424	449	426	361	753	679	746	707	744
Loaded outwards	809	902	893	802	766	211	213	192	184	260	399	450	479	423	367
Empty	597	413	580	499	558	190	156	146	138	160	368	322	395	353	393
No of port calls by ships in GT range	13	12	13	13	9	3	3	2	2	2	4	3	4	4	4
Elapsed berth time for ships in GT range *(hours)*	48	35	33	32	34	27	22	19	19	19	34	28	29	26	24
Charges per ship visit *($)*															
Total ship-based charges	12 676	12 644	13 299	13 348	13 619	33 092	32 985	34 399	34 596	35 177	39 269	39 141	40 844	41 063	41 760
Empty TEUs [b]	6 443	4 452	6 574	5 659	6 482	2 055	1 685	1 650	1 560	1 853	3 967	3 474	4 478	4 004	4 563
Ship-based charges ($/TEU)															
Conservancy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tonnage	1	1	1	1	1	10	11	11	12	12	8	8	8	8	9
Pilotage	2	2	2	2	2	6	6	7	7	7	3	3	3	3	4
Towage	2	2	2	2	2	22	23	24	26	25	14	15	13	15	15
Mooring, unmooring [c]	0	0	0	1	1	1	2	2	2	2	1	1	1	1	1
Total ship-based charges *($/TEU)*	5	5	5	5	5	39	42	44	46	45	26	27	25	28	28
Fees and charges for imports *($/TEU)*															
Ship-based charges	5	5	5	5	5	39	42	44	46	45	26	27	25	28	28
Cargo-based charges															
Wharfage	72	72	75	75	77	72	72	75	75	77	72	72	75	75	77
Harbour dues	34	34	35	35	36	34	34	35	35	36	34	34	35	35	36
Other charges															
Stevedoring	177	176	176	172	172	177	176	176	172	172	177	176	176	172	172
Customs brokers' fees	163	163	163	163	163	163	163	163	163	163	163	163	163	163	163
Road transport charges	458	453	457	458	462	458	453	457	458	462	458	453	457	458	462
Total fees and charges *($/TEU)*	**908**	**902**	**911**	**909**	**916**	**942**	**939**	**950**	**950**	**955**	**929**	**924**	**932**	**931**	**938**
Port's share in national index [d]	**11%**	**11%**	**11%**	**11%**	**11%**	**11%**	**11%**	**11%**	**10%**	**10%**	**11%**	**11%**	**11%**	**10%**	**10%**

	5 000 to 20 000 GT ships					35 000 to 40 000 GT ships					50 000 to 55 000 GT ships				
	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015
Fees and charges for exports *($/TEU)*															
Ship-based charges	5	5	5	5	5	39	42	44	46	45	26	27	25	28	28
Cargo-based charges															
Wharfage	72	72	75	75	77	72	72	75	75	77	72	72	75	75	77
Harbour dues	34	34	35	35	36	34	34	35	35	36	34	34	35	35	36
Other charges															
Stevedoring	177	176	176	172	172	177	176	176	172	172	177	176	176	172	172
Customs brokers' fees	97	97	97	97	89	97	97	97	97	89	97	97	97	97	89
Road transport charges	458	453	457	458	462	458	453	457	458	462	458	453	457	458	462
Total fees and charges *($/TEU)*	**842**	**837**	**845**	**843**	**842**	**876**	**873**	**884**	**884**	**881**	**863**	**859**	**866**	**865**	**864**
Port's share in national index[e]	**11%**	**11%**	**11%**	**10%**	**10%**	**10%**	**10%**	**10%**	**10%**	**10%**	**10%**	**10%**	**10%**	**10%**	**10%**

Notes: Estimates of charges and fees are rounded to the nearest whole dollar. A value of zero indicates that the charge or fees per TEU is less than fifty cents.
Blank cells mean the data are not reported.

a The average TEUs exchanged and the ship call parameters are mean values for ships in the GT category for the period in question.

b Sum of wharfage, harbour dues, berth charges and channel fees charged per empty TEU multiplied by the average number of empty TEUs exchanged.

c BITRE estimates.

d This is estimated as the TEU imports brought to the port as a per cent of five ports TEU imports.

e This is estimated as the TEU exports brought to the port as a per cent of five ports TEU exports.

Sources: BITRE estimates based on ship call data from port authorities and other sources as described in text.

Table 4.6 The national port interface cost indices, by size of ship

		Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015
	ABS GDP deflator (100.0 for Jan-Jun 2015)	101.4	101.4	100.7	100.3	100.0
				($ per TEU)		
5 000 – 20 000 GT ships	Import costs: in nominal price	1 014	1 023	1 029	995	996
	Import costs: constant 2015 price	1 000	1 009	1 023	992	996
	Export costs: nominal price	989	995	1 004	970	963
	Export costs: in constant 2015 price	976	981	997	967	963
35 000 – 40 000 GT ships	Import costs: in nominal price	962	967	972	971	974
	Import costs: constant 2015 price	949	954	966	968	974
	Export costs: nominal price	936	937	945	946	940
	Export costs: in constant 2015 price	924	925	939	943	940
50 000 – 55 000 GT ships	Import costs: in nominal price	959	967	972	970	973
	Import costs: constant 2015 price	946	953	966	967	973
	Export costs: nominal price	933	937	945	945	939
	Export costs: in constant 2015 price	921	924	939	942	939

Notes: Blank cells mean the data are not reported.

Values in constant 2015 prices are derived using the ABS GDP deflator with Jul–Dec 2015 as the base period. Constant price = Nominal or current price* (Base period deflator/ Current year deflator).

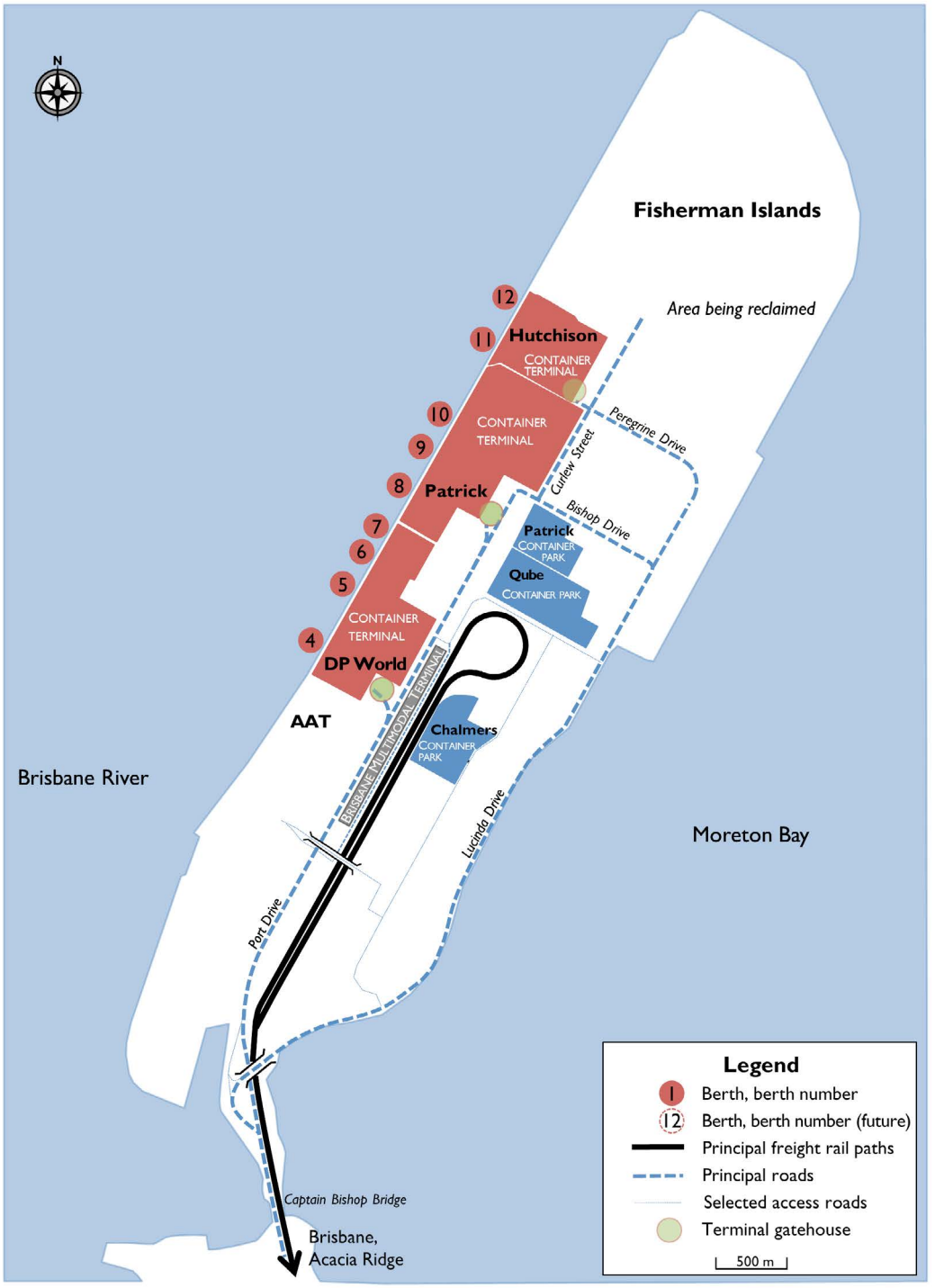
Sources: BITRE estimates based on data in Tables 4.1 to 4.5 and data from ABS (2016).

APPENDIX A

Maps of five major Australian container ports

This appendix presents maps of container terminals and supplementary information about facilities and port services available at the five major Australian container ports.

Brisbane (Fisherman Islands terminals)



(Last updated: September 2016)

Brisbane (Fisherman Islands Terminals)

The Port of Brisbane is managed and developed by the Port of Brisbane Pty Ltd, under a 99-year lease from the Queensland Government.

Dockside

Stevedores. The map shows the DP World, Patrick and Hutchison Ports Australia terminals. Some containers are also handled by Australian Amalgamated Terminals (AAT), who provide a multi-purpose, multi-user facility that is based at Berths 1–3, to the west of the DP World container yard.

Berths. DP World operates from container berths 4–7. The Patrick container berths are 8–10. Hutchison operates berths 11 and 12.

Equipment. DP World has 4 cranes, including 3 post-Panamax cranes and one Panamax crane. DP World's semi-automated terminal has 14 automated stacking cranes, with two more due to be commissioned in January 2017. Patrick has 5 cranes, consisting of 4 post-Panamax cranes and one Panamax crane; in addition, Patrick has 31 automated straddle carriers (AutoStrads). Hutchison's Brisbane Container Terminals includes 4 post-Panamax cranes and 6 automated stacking cranes.

Road

Road access to the area is via the bridge to Fisherman Islands, over the Captain Bishop Bridge. Access to the DP World and Patrick terminals is via Port Drive or Lucinda Drive/Bishop Drive/Curlew Street; access to the Hutchison terminal is via Curlew Street.

Rail

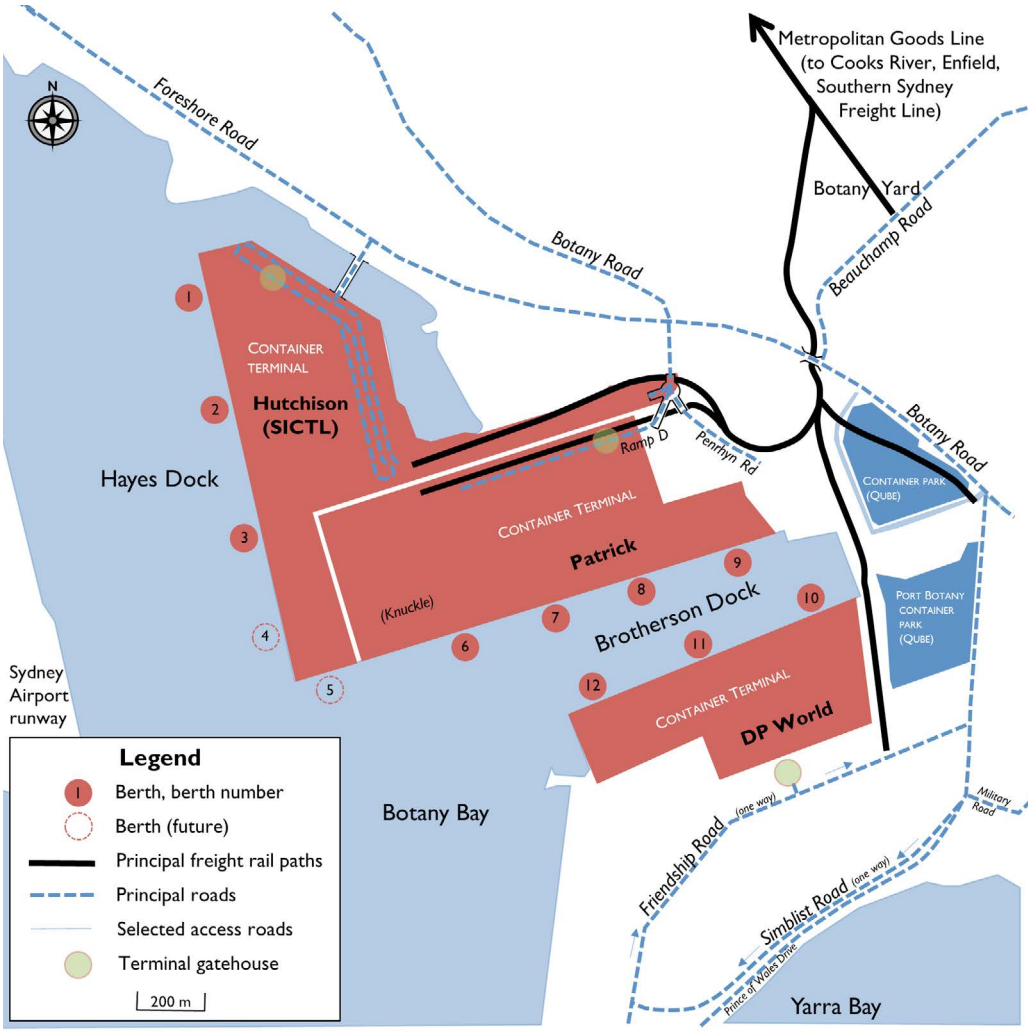
Facilities. An intermodal facility is provided on Fisherman Islands — the Brisbane Multimodal Terminal. Train lengths of up to 850 metres are permitted. Containers are shifted by road between that terminal and the container terminals. In that context, rail access is classed as having "near-dock" facilities.

Services. Scheduled rail services to the Brisbane Multimodal Terminal include long haul:

- bulk coal from West Moreton and grain from western Queensland, both via narrow gauge;
- reefer containers containing meat from northern abattoirs, by narrow-gauge trains;
- some containers are taken from Fisherman Islands—the presumption is that they are mainly empty containers; and
- there are no scheduled standard-gauge container trains.

National rail connections. Dual narrow and (national) standard gauge tracks are installed between Fisherman Islands and the interstate/intrastate intermodal terminal at Acacia Ridge.

Sydney (Port Botany Terminals)



(Last updated: November 2015)

Sydney (Container Terminals at Port Botany)

Port Botany is managed by the NSW Ports Consortium, which has a 99-year lease of the State-owned assets at the port.

Dockside

Stevedores. The three container terminals at Port Botany are served by the stevedores Patrick, DP World and Hutchison (Sydney International Container Terminals Limited, SICTL).

Berths. Patrick operates four berths, numbers 6–9. DP World's three berths are numbered 10–12. Hutchison has three operational berths (1–3), with berths 4 and 5 to be added in the future.

Equipment. DP World equipment includes 4 twin-lift quay cranes and 4 single-lift quay cranes. DP World took delivery of their latest twin-lift, post-Panamax crane in March 2015. Patrick equipment includes 7 twin-lift quay cranes and 1 single-lift quay crane. The Hutchison terminal includes 4 post-Panamax quay cranes.

The Patrick terminal has implemented an automated container yard, with 45 automated straddle carriers (AutoStrads). Automatic operations commenced on 2 April 2015.

The Hutchison terminal operates 12 automated stacking cranes.

Road

Access to the DP World terminal is via Friendship Road (one-way). The Patrick terminal is accessed from Penrhyn Road. Hutchison's terminal is accessed via a bridge from Foreshore Road.

Rail

Facilities. Each stevedore has rail facilities near to, but not on, its berths.

DP World has 3 sidings of 340 metre length. Patrick has 2 sidings of 650 metre length. Hutchison's terminal has 2 rail sidings of 680 metres; these are parallel to the Patrick sidings.

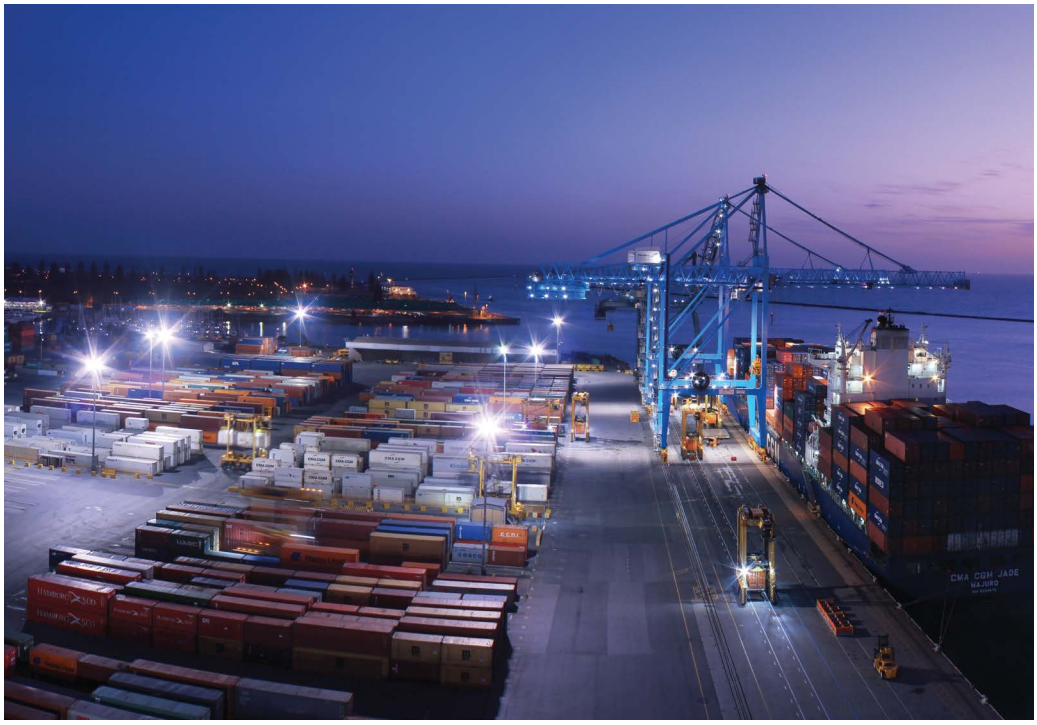
Services. Scheduled short-haul and long-haul rail container services between Botany and the hinterland include:

- Yennora, Cooks River and Minto.
- logs and grain from Kelso (Southern Shorthaul Railroad; Pacific National);
- reefer containers carrying processed meat, and grain in standard containers from Dubbo (Fletcher Export International/Southern Shorthaul Railroad; Qube);
- specialised grain transport from Coonamble (Qube);
- cotton and agricultural produce from Nevertire, Warren, Warren South, Trangie, Narrabri, Wee Waa, Narromine and Forbes (Qube; Genesee & Wyoming; Sydney Rail Services);
- paper products and grain from Harefield (Qube);
- scrap metal from Canberra (Espee Railroad Services);

- aluminium, logs and agricultural produce from Walsh Point, Carrington and Sandgate [Newcastle] (Qube and Crawfords Freightlines/Sydney Rail Services).

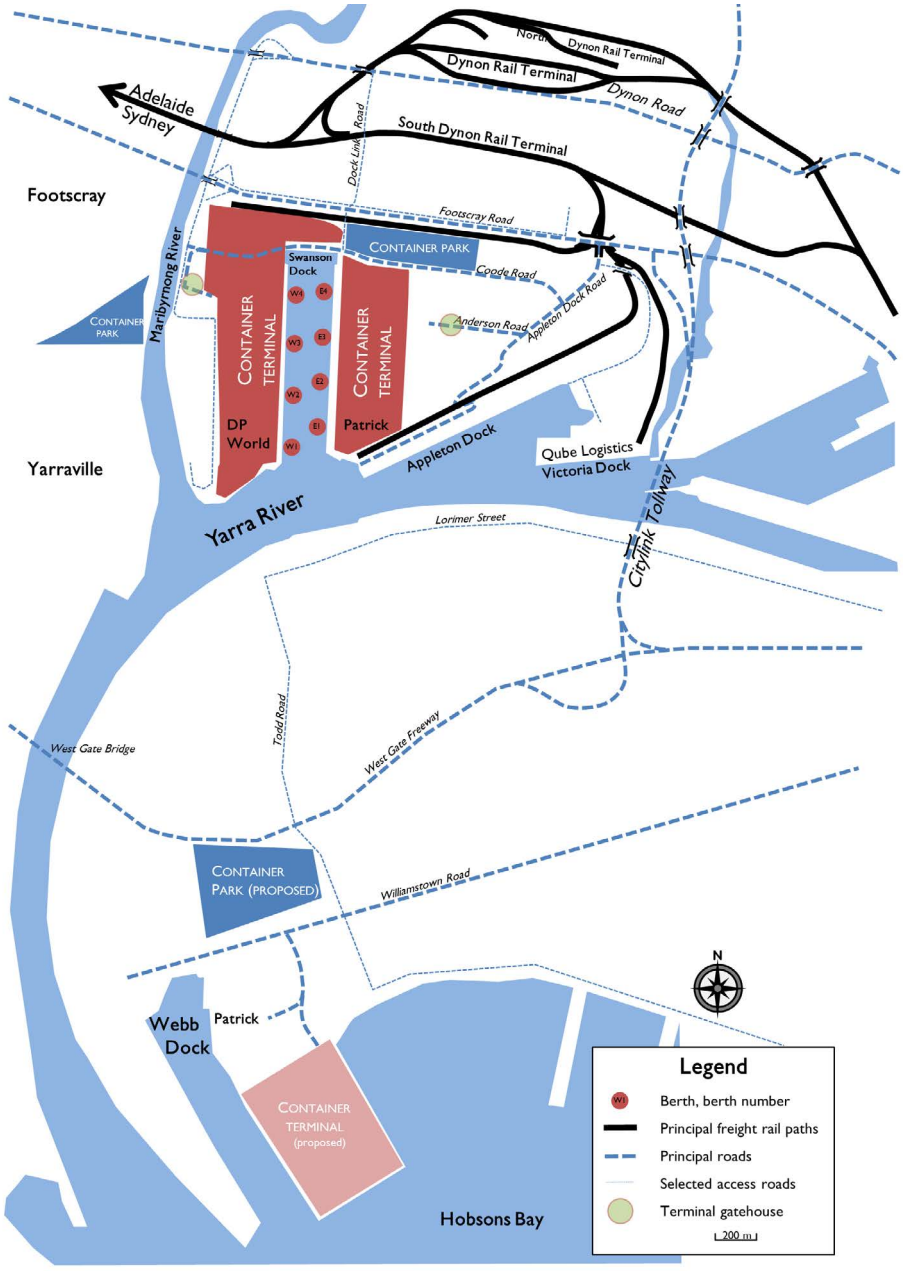
Rail access. Railway sidings at Botany Yard are used to regulate train entry to the port; to split trains, where necessary, for onwards movements to the port, and to re-form trains from port-terminal wagon rakes for movements to Cooks River, Enfield and beyond.

National and regional rail connections. The port is linked to the intrastate and interstate rail network, including the Southern Sydney Freight Line, and Northern Sydney Freight Corridor via the Metropolitan Freight Network (including the Port Botany Goods Line).



Ship at berth at Outer Harbor, Adelaide. Photo courtesy of Flinders Adelaide Container Terminal.

Melbourne



(Last updated: November 2014)

Melbourne (Swanson, Appleton and Victoria Dock terminals)

The Port of Melbourne Corporation, a public corporation, manages the port.

Dockside

Stevedores. DP World's container terminal is at Swanson Dock West. Patrick has a container terminal across the dock at Swanson Dock East. Patrick also handles some containers along with general freight at its 3-berth Webb Dock East site.

Logistics. Qube Logistics has a container and general cargo terminal at Victoria Dock, with one berth.

Equipment. The Patrick terminal has 8 cranes, of which 3 are post-Panamax; the DP World terminal has 8 cranes, including 3 post-Panamax. Patrick has 42 straddle carriers while DP World has 48 straddle carriers.

Berths. There are 4 container berths at Patrick's Swanson Dock East—berths E1–E4. There are 4 berths at DP World's Swanson Dock West—berths W1–W4. There is one general cargo berth at Victoria Dock (berth 24) which handles containers.

Road

Access to the DP World terminal is via Coode Road. Access to the Patrick terminal is via Appleton Dock Road; an access road leads to the Qube terminal from Appleton Dock Road.

Rail

Facilities. Import and export containers are rail-served to near the dockside. Containers are also railed through the Dynon rail terminals (to the north of the docks) and conveyed by road between those terminals and the on-dock container stacks.

- West Swanson Intermodal Terminal serves DP World. This is a single dual-gauge (standard and broad) siding of 510 metres, running just to the south of Footscray Road; there is also a locomotive run-around track;
- Appleton Dock rail yard serves Patrick. The yard has two dual (standard and broad) gauge tracks of 640 metres in length and a locomotive run-around track;
- Qube's Victoria Dock sidings have two dual-gauge (standard and broad) sidings, with 630 metre lengths, plus a locomotive run-around track.

Services. Scheduled long-haul rail services shifting containers include:

- rice from Deniliquin to Victoria Dock sidings (Qube, broad gauge);
- paper products from Maryvale to Victoria Dock sidings (Qube, broad gauge);
- milk products from Shepparton/Mooroopna to Victoria Dock sidings (Qube, broad gauge);
- meat and milk products from Westvic/Warrnambool to Appleton Dock (Pacific National, broad gauge);

- grain and other agricultural products from Tocumwal to Appleton Dock (Pacific National, broad gauge);
- cotton, wine and agricultural products, including fruit in reefer containers, from Merbein/Mildura to Appleton Dock (Pacific National, broad gauge);
- grain and other agricultural products from Dooen to West Swanson Dock (SCT/Wimmera Container Line, standard gauge);
- car parts from Adelaide (Port Flat) to Appleton Dock (Patrick, standard gauge);
- cotton, beverages, meat and agricultural products from Griffith, Wumbulgal, Leeton and Ettamogah to Appleton Dock (Pacific National, standard gauge).

Port rail containers also arrive by road shuttles from the Dynon railway terminals, including:

- Adelaide (Islington) to South Dynon (Pacific National, standard gauge).

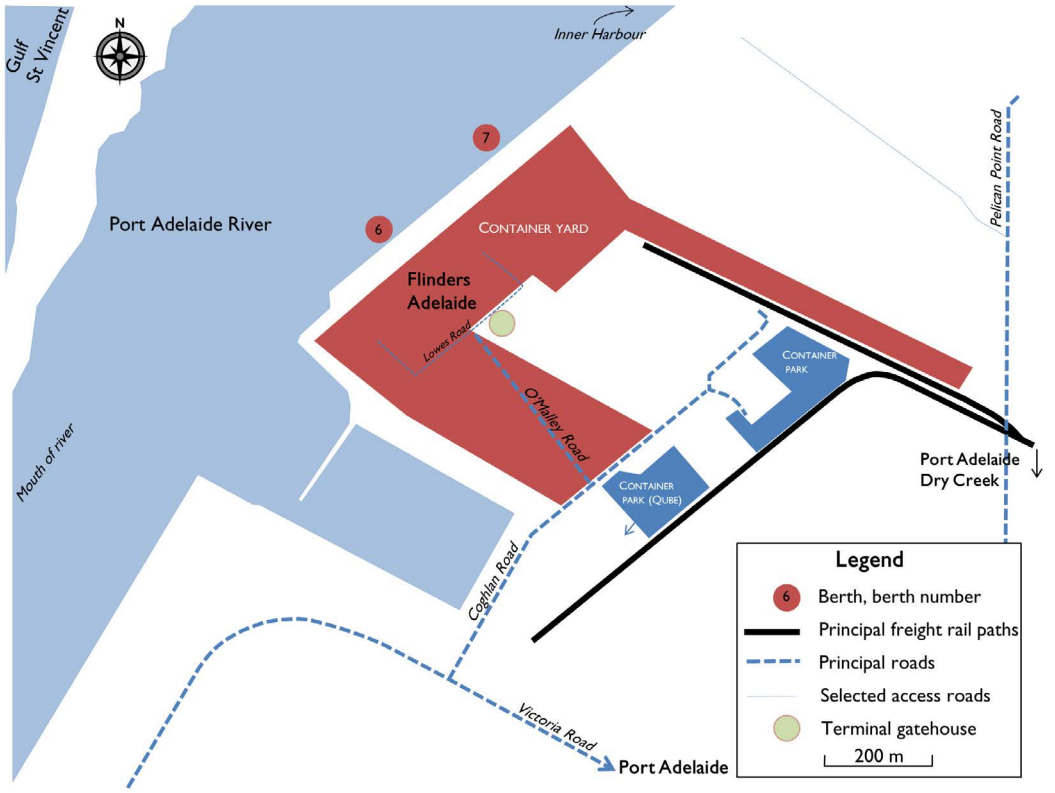
Rail linkages. The dock area consists of rail facilities near the docks and the nearby intermodal container terminals at South Dynon, Dynon and North Dynon. Although there is an eastern link from the Dynon terminals towards the east (Southern Cross and Flinders Street), the container movements are to and from the west via the Tottenham–Dynon line.

Of the five container ports represented here, the Port of Melbourne is unique in the proximity of intermodal terminals near to the docks as well as the on/near-dock facilities.

National rail connections. Principal freight rail paths are shown; most tracks (including dockside tracks) are dual gauge (namely, broad- and standard-gauge tracks). Access to the interstate network is via the dual-gauge track to the west, via Tottenham.

Two new blue post-Panamax Liebherr cranes were commissioned at the Flinders Adelaide Container Terminal in 2015. Photo courtesy of Flinders Adelaide Container Terminal.

Adelaide (Flinders Adelaide Container Terminal at Outer Harbor/Pelican Point)



(Last updated: November 2014)

Adelaide (Flinders Adelaide Container Terminal at Outer Harbor/Pelican Point)

Flinders Ports manages the port facilities in Adelaide; these are at Outer Harbor and the Inner Harbour (up the Port Adelaide River).

Dockside

Stevedores. Port Adelaide's Outer Harbor Container Terminal is operated by Flinders Adelaide, using two berths.

Berths. The map shows the container terminal located in the outer harbour (at Outer Harbor) of Port Adelaide; the Inner Harbour at Port Adelaide is not shown. The Flinders Adelaide container facilities use berths 6 and 7.

Equipment. The terminal has four travelling container-handling cranes (Panamax-standard). The terminal commissioned two new post-Panamax cranes in June 2015.

Road

Flinders Adelaide Container Terminal is accessed in O'Malley Road, leading from Coghlan Road.

Rail

Facilities. The Outer Harbor terminal has two sets of standard-gauge rail sidings. Two sidings, each of 640 metre length, serve the Flinders Adelaide Container Terminal. The other set of sidings serve the Qube Logistics terminal and container park.

Services. Scheduled railed movements to the dockside include:

Short-haul:

- Penfield (Direk) to Flinders Adelaide (SCT Logistics).

Long-haul:

- containerised lead from Port Pirie, agricultural products from Bowmans Intermodal Terminal, via Port Flat. (Patrick PortLink SA)
- bulk grain from various producers. Some of this is containerised at Viterra's (ABB) grain loader (inverter) for export.

Rail linkages. The Outer Harbor facility is at the extremity of a freight-only railway between Outer Harbor, Port Adelaide and Dry Creek.

National rail connections. The Outer Harbor–Dry Creek line connects with the interstate network at Dry Creek. Nearby intermodal terminals include the Asciano terminals at Port Flat and Islington and the SCT Logistics terminal at Penfield (Direk).

Commissioning of two new cranes at Outer Harbor

Flinders Adelaide Container Terminal took delivery of two Post Panamax Liebherr Cranes in January 2015. The two new cranes were assembled in a secure, dedicated area within the terminal and positioned onto the wharf in May 2015. Two existing Panamax class cranes, which had been in service for over 30 years, were removed from the quay and dismantled on site. After a detailed assembly and commissioning period of five months, the new cranes commenced operations in July 2015 and since that time the facility has seen a marked improvement in productivity. The Adelaide Terminal now has three Post Panamax Cranes and a modern, single Panamax Crane. From a terminal efficiency perspective, the arrival of the new cranes was timely given the dramatic increase of wide-beam vessels Australia has witnessed in the past 18 months.

In advance of the arrival of the new cranes, Flinders Adelaide Container Terminal invested in a state-of-the-art crane simulator set up to replicate the cabin of the new cranes. This allowed the crane operators to familiarise themselves with the controls and features of the new cranes before the new cranes were actually commissioned. The simulator consisted of a double-pod (two cabins) where two operators can be trained at the same time and can even interact with each other. For example, a crane operator can work with a straddle driver on the ground in a controlled, simulated scenario.

The simulator can create a range of different scenarios for trainees. These include bad weather, poor light conditions and container hazards, for example containers which have been damaged or moved into a position on a ship that is hard to access due to bad weather on the voyage to South Australia. More recently the capabilities of the simulators have been extended to include yard handling equipment (straddle carriers) working in a replicated environment that mirrors the Adelaide yard layout and servicing vessels that are identical to vessels that call at the terminal.

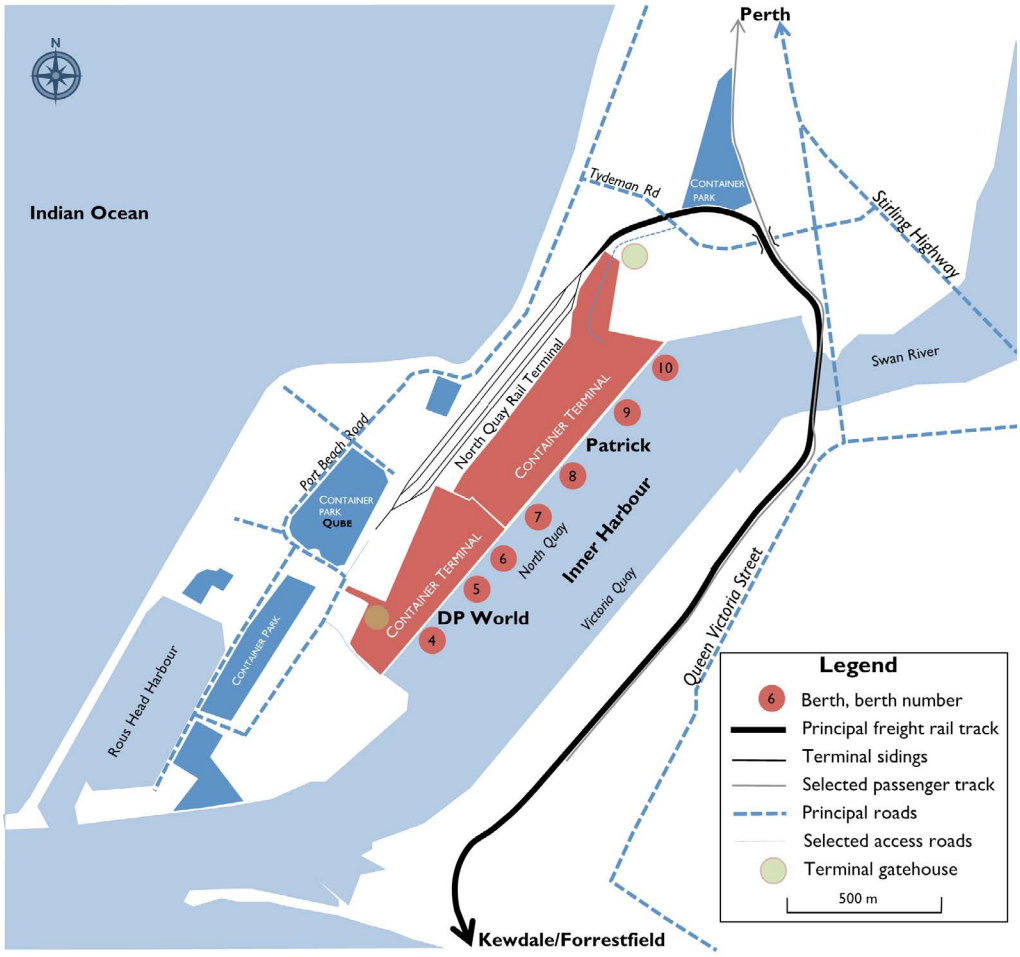
The training simulator is the largest and most advanced of its kind in the southern hemisphere. High-risk training can be done in controlled and completely safe environment and it does not impact on the productivity of loading and unloading vessels.

In order to assemble the new cranes on site Flinders Adelaide Container Terminal sealed an additional 1.5 hectares of hardstand which takes potential annual throughput capacity at the Adelaide facility to just under 500,000 TEU. In addition to the new hardstand five Terex straddle carriers were purchased in 2014, bringing the total fleet to 22. Since Flinders Port Holdings purchased the terminal in 2012 it has invested close to $50 million on plant and equipment to improve efficiencies.

Source: Text provided by Flinders Ports in April 2016.

Cranes working a vessel at Flinders Adelaide Container Terminal. Two new cranes are painted blue.
Photo courtesy of Flinders Adelaide Container Terminal.

Fremantle (North Quay Terminals in the Inner Harbour)



(Last updated: August 2016)

Fremantle (North Quay Terminals in the Inner Harbour)

Fremantle Ports, a Western Australian Government trading enterprise, manages the port.

Dockside

Stevedores. Container stevedoring is undertaken at North Quay in the Inner Harbour by Patrick and DP World. Patrick have four berths and DP World has three berths.

Berths. Patrick's berth 10 is a multi-purpose container, ro-ro and general cargo facility. The six other stevedore berths are dedicated container ship berths.

Equipment. The Patrick terminal has 4 cranes, of which 3 are post-Panamax; the DP World terminal has 3 cranes, including 2 post-Panamax. DP World commissioned its second post-Panamax crane in April 2015.

Road

The principal roads on this peninsula are Tydeman Road (from the Stirling Highway) and Port Beach Road/Rudderham Drive. The DP World terminal is accessed via Rudderham Drive while the Patrick terminal is accessed via Tydeman Road.

Rail

Facilities. North Quay Rail Terminal, to the west of the Patrick terminal, serves both Patrick and DP World container terminals. The sidings at that location are around 690 metres in length, accommodating blocks of 600 metre-length trains. The Rail Terminal has dual-gauge tracks.

Services. Scheduled rail services to the port include the following (standard-gauge) trains:

Short-haul:

- A container train operates between Kewdale/Forrestfield and the North Quay Rail Terminal. (Intermodal Link Services/SCT)

Long-haul:

- nickel matte from Kalgoorlie for WMC Resources/BHP Billiton. (Aurizon)

Rail linkages. Trains access the Rail Terminal on a dual narrow- and standard-gauge freight-only line from Midland. Freight and passenger trains share a track on the bridge over the Swan River.

National rail connections. The rail link to Midland, on the interstate network, includes spur tracks to interstate intermodal terminals at Kewdale and Forrestfield.

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